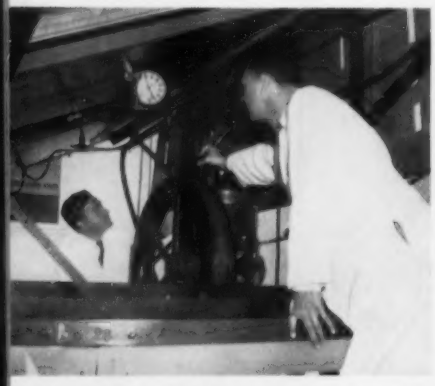
ELECTRICAL WEST

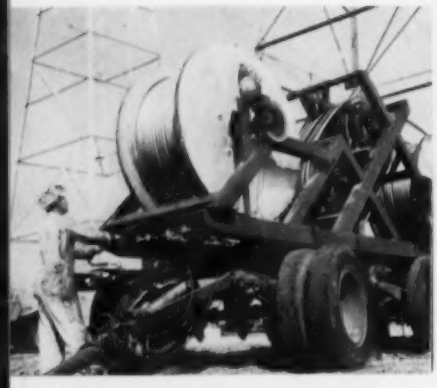
November 1955
50 Cents

Part I

SPOKESMAN FOR THE MOST HIGHLY ELECTRIFIED REGION OF THE U.S.



Power From the Sun 71



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Manufacturers' Directory Issue

speed to spare
Speed is one of the very best features of cooking *electrically*. A modern electric range cooks with fast intense heat which springs into action instantly, reaches desired temperature in seconds and stays right there until food is cooked to perfection. With no "warm-up" needed and no heat lost, it's just a step from start to serving . . . and you get perfect results every time.
Electric cooking is for you: it's so much better . . . yet it costs so little!
Edison
Good Service, Square Dealing, Courteous Treatment
Southern California Edison Company
neatly done
You'll still have cleaning up to do . . . but it's a much easier job when you do your cooking *electrically*. You'll be amazed at the way pots, pans and other utensils remain bright and shiny without scrubbing or scouring. Electric heat is the cleanest ever . . . it lets you cook every day and still keep your "kitchen police" duties down to a comfortable minimum. Kitchen walls and ceiling stay cleaner longer, too, so you save on redecorating.
Electric cooking is for you: it's so much better . . . yet it costs so little!
Edison
Good Service, Square Dealing, Courteous Treatment
Southern California Edison Company

doing business locally...

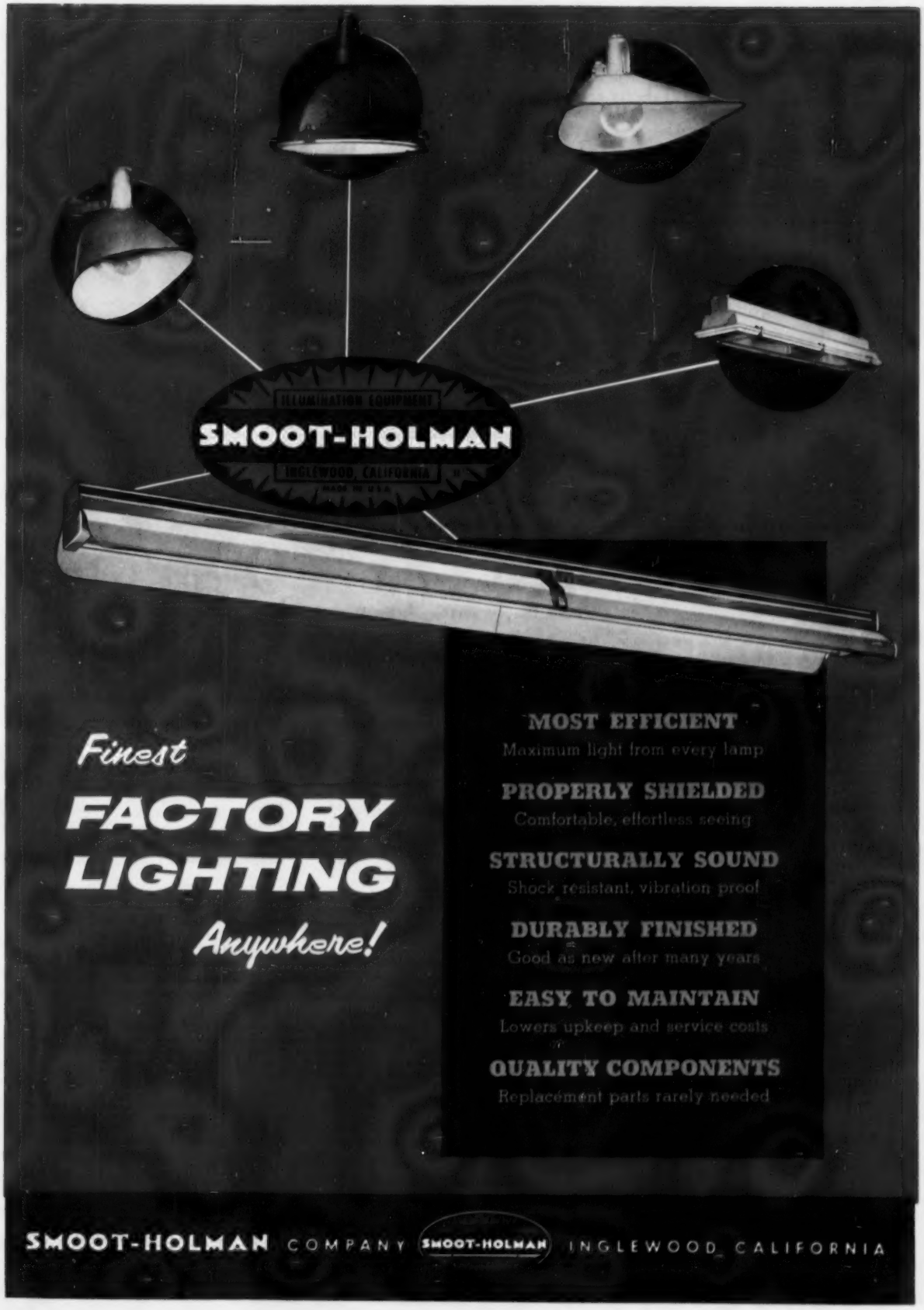
We give you, here two examples of current Edison appliance-selling advertisements. Note, please, that they show no appliances and mention no brand names.

Negative selling? Not at all. It is simply that what we sell is electric living, with all its benefits and advantages.

Edison advertising is designed to get its strongest selling impact at the local level . . . put there by dealers who buy tie-in advertisements and make the actual sales. The selling formula which has been working successfully for more than half a century is: "Edison tells them, and the dealer sells them!" The results: better living in local homes, better business for local dealers.

Good Service, Square Dealing, Courteous Treatment

SOUTHERN CALIFORNIA EDISON COMPANY


ILLUMINATION EQUIPMENT
SMOOT-HOLMAN
INGLEWOOD, CALIFORNIA
MADE IN U.S.A.
Finest
FACTORY
LIGHTING
Anywhere!
MOST EFFICIENT
Maximum light from every lamp
PROPERLY SHIELDED
Comfortable, effortless seeing
STRUCTURALLY SOUND
Shock resistant, vibration proof
DURABLY FINISHED
Good as new after many years
EASY TO MAINTAIN
Lowers upkeep and service costs
QUALITY COMPONENTS
Replacement parts rarely needed
SMOOT-HOLMAN COMPANY SMOOT-HOLMAN INGLEWOOD, CALIFORNIA

ELECTRICAL WEST

SPOKESMAN FOR MOST HIGHLY ELECTRIFIED REGION OF THE U. S.

THE ALL-INDUSTRY MAGAZINE OF PROGRESS, ESTABLISHED 1887,
and incorporating the "Electrical Journal," "Journal of Electricity, Power and Gas" and "Journal of Electricity." Contents copyright. Sixty-ninth year of publication.

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Next Month

Leading articles will include: employee training program; economical new distribution using racked bare secondary with spacers for midspan service taps; first commercial installation of a vacuum switch for high-voltage line dropping; preformed splices for ACSR; residential underground; a new approach to electric space heating; electrical features of the architecturally outstanding new Latter Day Saints temple in Los Angeles; and the new NBC TV color studio at Burbank.

ADVERTISING REPRESENTATIVES

Chicago (11) ..... Michael I. O'Connell, 520 N. Michigan Ave.
Cleveland (15) ..... Frank Seiler, R. A. Hubley, 1510 Hanna Bldg., Superior 1-7000
Los Angeles (17) ..... Carl Dysinger, 1111 Wilshire Blvd., MA 6-4323
New York (36) ..... G. W. Simpson, 330 W. 42nd St.
San Francisco (4) ..... Tom Carmody, Dick Alcorn, 68 Post St., DO 2-4600

Offices: Atlanta, Boston, Dallas, Detroit, Philadelphia, Pittsburgh, St. Louis

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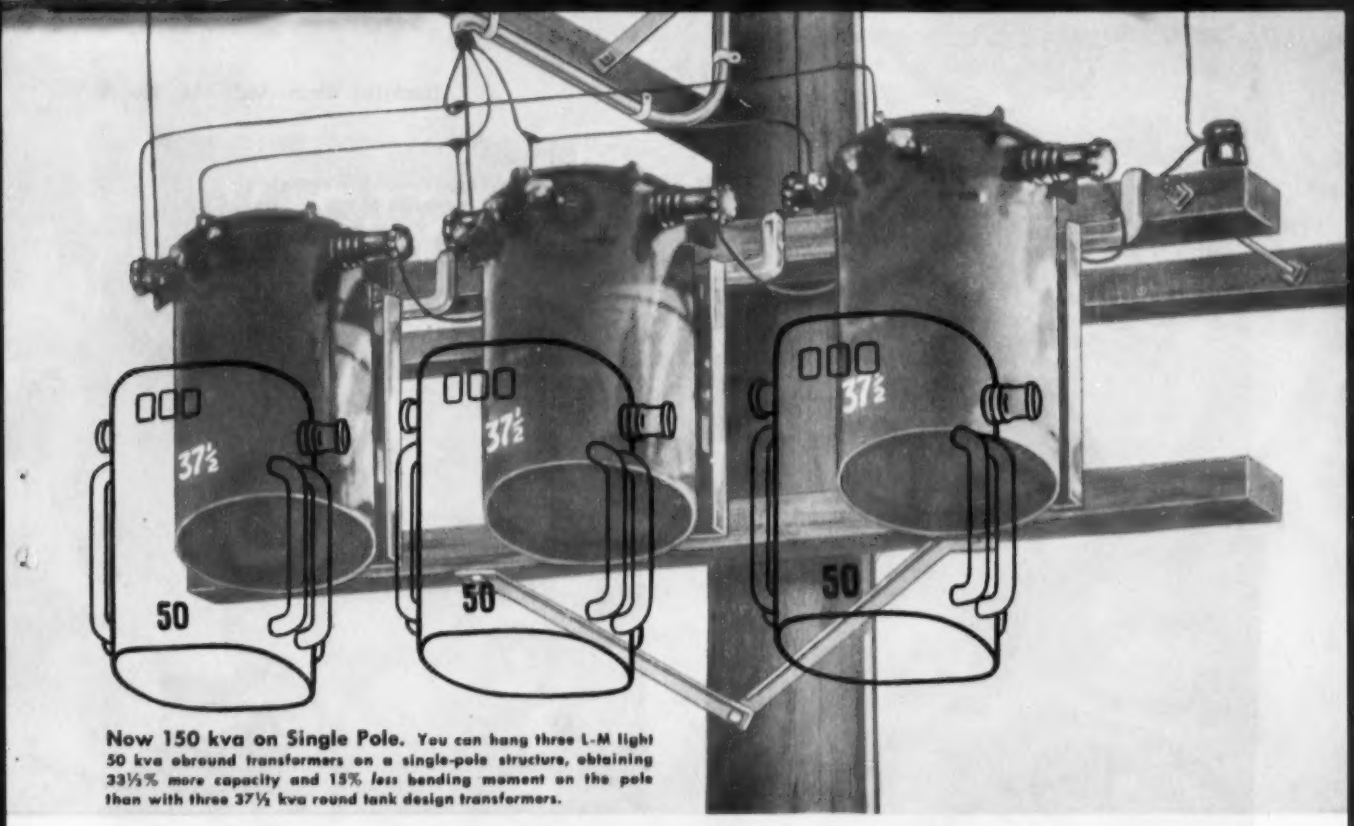


Now 150 kva on Single Pole. You can hang three L-M light 50 kva obround transformers on a single-pole structure, obtaining 33⅓% *more* capacity and 15% *less* bending moment on the pole than with three 37½ kva round tank design transformers.

How L-M Obround Design Provides Additional Capacity On Structures

New obround tank design is smaller, lighter, has shorter moment arm, retaining all outstanding Round-Wound® performance characteristics.

By **ALVIN B. COYLE**
Manager
Transformer Sales
Line Material Company

Now you can hang transformers of larger capacity on a pole structure with L-M's lighter, smaller obround transformer tank design. The additional capacity is obtained without changing outstanding performance characteristics of L-M's Round-Wound design.

Less Weight

The obround design provides a smaller tank with less transformer oil, resulting in a lighter, easier-to-handle transformer. Cooling tubes are installed where necessary to provide the cooling surface for maintaining the same low hot-spot and top oil temperature-performance characteristics found in all other L-M transformers. In addition, the transformer's repetitive overload capacity is improved as the result of the faster transfer of heat from the coils to the cooling air.

Shorter Moment Arm

L-M's new obround design brings the center of gravity closer to the pole, which reduces the moment arm distance from the pole. The combination of lighter weight and less moment arm distance substantially decreases the total bending moment on the pole and crossarms, and thus greatly increases the potential capacity of all your transformer structures.

You can take advantage of savings such as these:

Larger transformers can be hung closer to the top of the pole, eliminating the need for a higher pole and additional spacing.

Single-pole, three-phase transformer structures can now serve more load with the additional transformer capacity available. New 50 kva obround transformers have less bending moment on the pole and on crossarms than previous 37½ kva round tank design. Here L-M's light obround transformers may eliminate the need for costly two-pole structures.

Pole-Mounted 167 kva Transformers

L-M's light-weight 167 kva transformer can be pole-mounted; provides a full 167 kva of capacity on a single-pole structure. And it, too, provides L-M's well-known overload capacity.

To serve three-phase loads you can hang three L-M light 167 kva transformers or 500 kva on a two-pole structure, eliminate expensive platforms, ground pads, or vaults in many instances, and make further use of existing facilities.

L-M's light, obround design transformers are available in single-phase 5 kva through 167 kva in each standard distribution voltage class.

Get Details On Lighter-Weight Obround Transformers

Ask the L-M Field Engineer for application information, weights and dimensions on L-M obround transformers and the exclusive Round-Wound design. Or write Mr. Coyle at Line Material Company, Transformer Division, Zanesville, Ohio (a McGraw Electric Company Division).

219-A-R

LM® LINE MATERIAL Transformers

Mr. W. T. Pyle displays the new, compact Westinghouse DB breakers now rated to a maximum of 150,000 amps.

NEW exclusive functions in L. V. air breakers now up to 150,000 amps interrupting capacity

Three new design developments make Westinghouse L. V. circuit breakers the most versatile, the most useful you can buy.

1. Two new ratings—the DB-75 and DB-100—provide you now with a complete line.
2. Interrupting ratings on all frame sizes have been increased on 240-volt and 480-volt nonselective applications to a maximum of 150,000 amps for the DB-100 at 240-volt.
3. The entire line of DB breakers is equipped with the new air-delayed overload tripping device with a unique range of adjustability, giving you new application opportunities—standard instantaneous and long-time-delay characteristics with a *total of 9 calibrated settings*, or, selective tripping units with numerous combinations of long- and short-time delay, *totaling 13 settings.*

There's more to the story—call your Westinghouse sales engineer, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-60885

Nonselective Application Ratings for DB Breakers

Frame Size	Old Rating	New Rating 240 volts	New Rating 480 volts
DB-15	15,000A	30,000A	25,000A
DB-25	25,000A	50,000A	35,000A
DB-50	50,000A	75,000A	60,000A
DB-75	75,000A	100,000A	75,000A
DB-100	100,000A	150,000A	100,000A

YOU CAN BE SURE...IF IT'S Westinghouse

Plants at Berkeley, Calif.; Sunnyvale, Calif.; Emeryville, Calif.; Los Angeles; Portland; Salt Lake City; Seattle; Denver

VICTOR "Know-How"...

Gives You Purified Porcelain Suspensions...

America's Finest

VICTOR NO. 924
(EEI-NEMA TDJ-52-5)
25,000 LB. SUSPENSION
INSULATOR

VICTOR *Purified* Porcelain suspension insulators are laboratory designed to make them the finest in their field. VICTOR'S complete testing facilities, which include the industry's most modern impulse generator, certify to the soundness of their design.

Take the 25,000 lb. unit shown above, for example. It has rugged, rounded corrugations for maximum strength and resistance to impact. Cap and ball bolt, built to the most rigid specifications, are thick, husky and double-dip galvanized to withstand the severe service for which this insulator was designed. Scientifically fitted glaze, properly and uniformly applied, gives added strength . . . added protection against contamination. Each insulator is proof-tested mechanically, then subjected to vigorous high frequency and 60-cycle flashover tests. You just can't buy a better suspension!

SPECIFICATIONS

60-cycle dry flashover	80 KV
60-cycle wet flashover	50 KV
Positive impulse flashover*	125 KV
Negative impulse flashover*	130 KV
Dry arcing distance	7¾"
Leakage distance	11"
M and E strength	25,000 lbs.
Impact rating	60 in. lbs.
RNI	50 Microvolts
1000 KC at applied	10 KV

*Crest KV, 1½ x 40 microsecond wave Critical Value.

NEWS FROM VICTOR

These two booklets—"The Story of Victor" and Bulletin No. 4—contain a wealth of insulator information that has proved of tremendous interest to thousands of power men throughout the nation. If you do not have both in your files, ready for instant reference, send for them today.

SPECIFY VICTOR Purified Porcelain Suspensions!

VICTOR INSULATORS DIVISION
I-T-E CIRCUIT BREAKER CO.
VICTOR, N. Y.

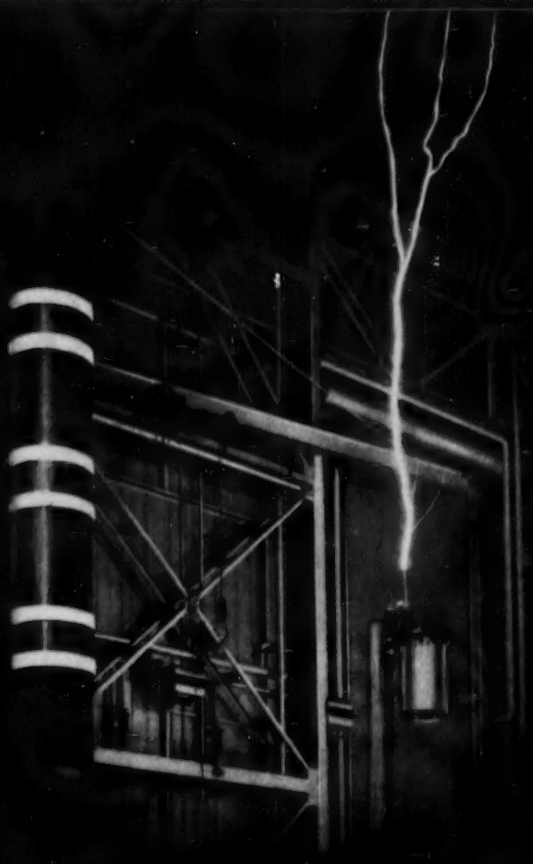
Low and High Voltage Pintypes • Suspensions • Guy Strains
Spools • Switch and Bus Insulators • Custom Designed Porcelain
Insulator Hardware

DISTRIBUTION
TRANSFORMERS
ATANA*

1953: SUPER MELAGLYP PAINT
INCREASES LIFE 50%

TOLEDO
NO SPRINGS · HONEST WEIGHT

1954: USE OF FORMEX WIRE
CUTS WEIGHT AND SIZE



1950: NEW HIGH-VOLTAGE LAB BUILT FOR BETTER RESEARCH

1937: GRAIN-ORIENTED CORE STEEL REDUCES PRICE, WEIGHT, SIZE

Four research landmarks that mean

MORE TRANSFORMER FOR YOUR DOLLAR

Research is a cold word until it is translated into what it does for you. Today's distribution transformers show how research gives you a better product for less money. Four high-spots are:

1954: Formex† wire cuts weight and size 5 to 10%. Constant research perfected a method of applying enamel insulation to rectangular transformer wire, thus extending the advantages this type insulation had already provided to G-E motors.

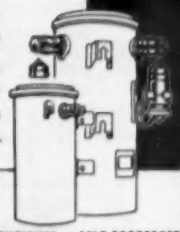
1953: Super Melaglyp increases paint life 50%—and this is only an average. In corrosive atmospheres, Super Melaglyp lasts up to 150% longer than the best previous finish.

1950: High Voltage Laboratory built for more effective research with tools such as the world's largest impulse generators (15,000,000 volts). Magne-valve lightning arresters are just one example of the value of this research.

1937: Grain-oriented core steel reduced price, weight, size. First utilized in the ingenious Spirakore† transformer design, this development alone has saved the electrical industry over $100,000,000. 431-25

†Reg. trade-mark of the General Electric Company.

*ATANA. It's easy to see that *All Transformers Are Not Alike* and G-E research will keep working to give you more transformer for your dollar. General Electric Company, Schenectady 5, New York.



CONVENTIONAL — SELF PROTECTED
take your choice
General Electric makes both

Progress Is Our Most Important Product

GENERAL ELECTRIC

PIN POINTED FOR SERVICE

Youngstown has 28 district sales offices conveniently located throughout the nation to serve you quickly. They are staffed with men who know the steel business thoroughly and are qualified to help you with your steel requirements. You can get quick service whether you write, wire or phone your nearby Youngstown District Sales Office.

QUALITY YOUNGSTOWN SERVICE

DISTRICT SALES OFFICES

Atlanta 1, Ga.
1310 Healey Building
Phone Walnut 5920

Boston 16, Mass.
250 Stuart Street
Phone Liberty 2-5855

Buffalo 2, N. Y.
1508 Liberty Bank Bldg.
Phone Washington 6270

Chicago 2, Illinois
111 W. Washington Street
Phone Franklin 2-5470

Cincinnati 2, Ohio
1302 Carew Tower
Phone Main 1424

Cleveland 13, Ohio
2400 Terminal Tower Bldg.
Phone Main 1-2605

Columbus 15, Ohio
2850 LeVeque Lincoln Tower
Phone Capitol 4-7211

Dallas 2, Texas
1602 First Nat'l. Bank Bldg.
Phone Riverside 9538

Denver 2, Colorado
814 Continental Oil Bldg.
Phone Main 3-2283

Des Moines 9, Iowa
437 Insurance Exchange Bldg.
Phone 3-1265

Detroit 2, Michigan
926 Fisher Bldg.
Phone Trinity 5-5816

Grand Rapids 2, Michigan
604 Michigan Nat'l. Bank Bldg.
Phone 9-4291

Houston 2, Texas
1350 Esperson Bldg.
Phone Fairfax 1325

Indianapolis 4, Indiana
520 Circle Tower
Phone Melrose 2-3461

Kansas City 6, Mo.
1222 Commerce Bldg.
Phone Victor 5837

Los Angeles 15, Calif.
714 W. Olympic Blvd.
Phone Prospect 7581

Milwaukee 3, Wisc.
2110 Wisconsin Tower
Phone Broadway 1-5148

Minneapolis 2, Minn.
1050 Baker Bldg.
Phone ATlantic 2970

New Orleans 12, La.
520 Whitney Bldg.
Phone Raymond 0153

New York 36, New York
500 Fifth Avenue
Phone Lackawanna 4-4340

Philadelphia 2, Pa.
1502 Girard Trust Bldg.
Phone Rittenhouse 6-9830

Pittsburgh 22, Pa.
Two Gateway Center
Phone Atlantic 1-2350

St. Louis 3, Mo.
611 Shell Bldg.
Phone Geneva 6-1223

San Francisco 5, Calif.
55 New Montgomery Street
Phone Garfield 1-6544

Seattle 4, Washington
457 Central Bldg.
Phone Main 6420

Tulsa 3, Oklahoma
1305 Philtower Bldg.
Phone 54-4634

Washington 5, D.C.
327 Bowen Building
Phone Republic 7-2340

Youngstown 1, Ohio
505 Stambaugh Building
Phone Riverside 7-0771

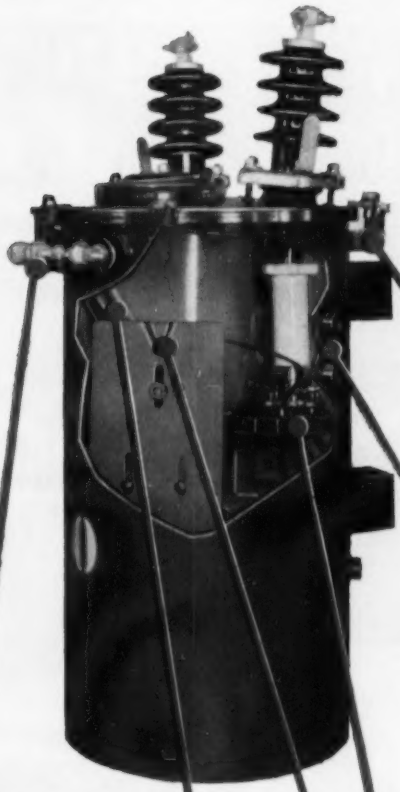
THE YOUNGSTOWN SHEET AND TUBE COMPANY

Manufacturers of Carbon, Alloy and Yoloy Steel

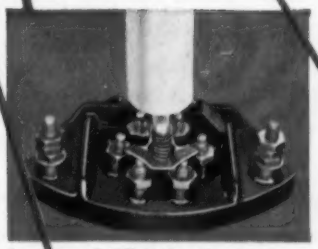
General Offices: Stambaugh Building - - Youngstown 1, Ohio
Plants: Youngstown, Ohio; Struthers, Ohio; Indiana Harbor, Indiana

SHEETS - STRIP - PLATES - STANDARD PIPE - LINE PIPE - OIL COUNTRY TUBULAR GOODS - CONDUIT AND EMT - MECHANICAL TUBING - COLD FINISHED BARS - HOT ROLLED BARS - BAR SHAPES - WIRE - HOT ROLLED RODS - COKE TIN PLATE - ELECTROLYTIC TIN PLATE - RAILROAD TRACK SPIKES - MINE ROOF BOLTS

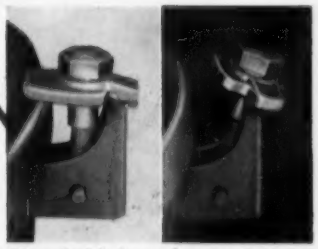
NEW KUHLMAN FEATURES



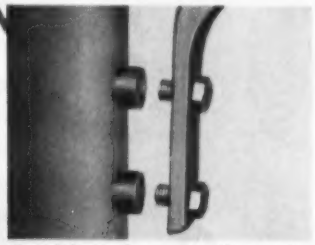
Low voltage bushings, and studs keyed to prevent rotation, eliminate all possibility of internal short circuits. Bushing connectors are designed for three way entrance of low voltage leads . . . from above, below, or front.



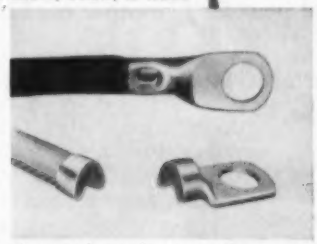
Improved "floating" action tap changer maintains positive pressure on both contacts by a spring actuated self-aligning mechanism.



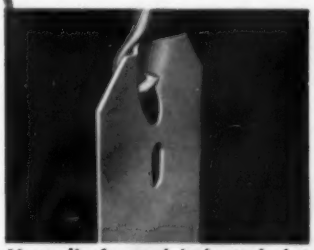
New hold down bars and nuts of forged brass maintain a uniform pressure-seal on transformer tanks . . . are not subject to rust or corrosion . . . do not have to be disassembled to remove cover as illustrated above (right).



Provisions for mounting either valve or expulsion type arresters are made on all Kuhlman transformers built to EEI-NEMA standards through 100 KVA single phase and 150 KVA three phase.



New crimped connections guarantee pullout values equal to 85% of the cable tensile strength and greater than 100% relative conductivity.



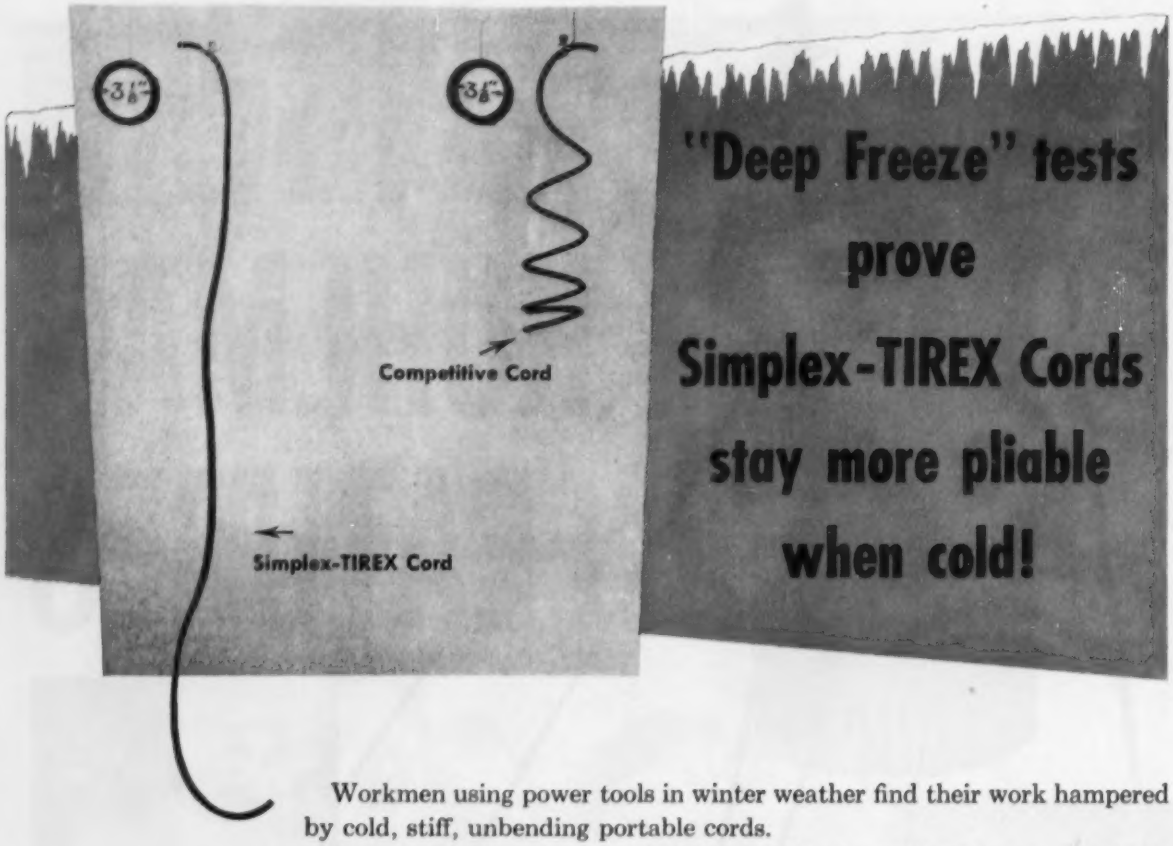
New die-formed indented slot in core clamp allows greater lifting hook clearance for ease in handling or removing core and coil assembly.

KUHLMAN

169

KUHLMAN ELECTRIC COMPANY, BAY CITY, MICHIGAN • CRYSTAL SPRINGS, MISSISSIPPI • SALINAS, CALIFORNIA

DISTRIBUTED BY **MAYDWELL & HARTZELL, Inc.** • SEATTLE, SPOKANE, PORTLAND, SAN FRANCISCO, LOS ANGELES, PHOENIX



Workmen using power tools in winter weather find their work hampered by cold, stiff, unbending portable cords.

Recent tests show that Simplex-TIREX Cords are three times more pliable than other cords when cold.

Here is what we mean.

Two 5-foot lengths of 2-conductor No. 18 SJO cord were wrapped around a 3⅛-inch steel mandrel. One cord was TIREX and the other was a competitor's.

Both samples were locked up in a refrigerator for one month at 36°F.

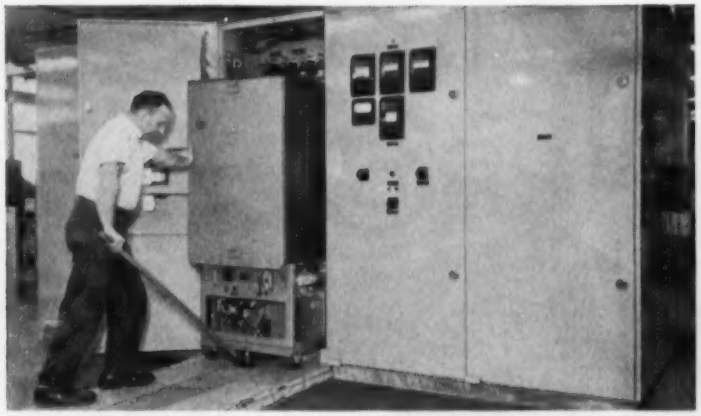
They were attached to the panel while still in the walk-in refrigerator. The panel was carried outside and immediately photographed. Notice the results. TIREX, on the left, is limp and pliable. The other cord looks like a coiled spring.

Which would you want on your portable tools? You can get genuine TIREX from your electrical distributor.

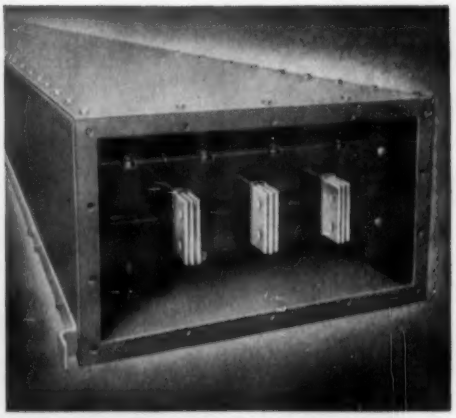
Simplex

TIREX

SIMPLEX WIRE & CABLE CO.
79 Sidney Street, Cambridge 39, Massachusetts

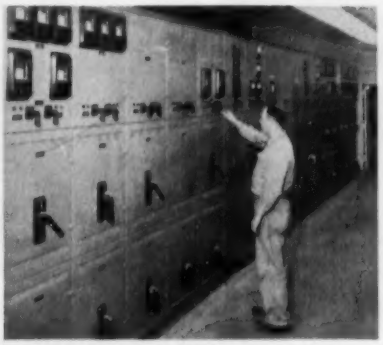


Metal-clad switchgear. Horizontal drawout air circuit breakers in rigid, all-welded enclosures. Available in ratings from 2400 v through 15 kv—50 through 500 mva interrupting and 2000 amp continuous.

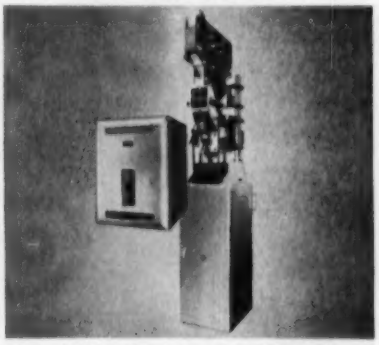


Nonsegregated phase, metal-enclosed bus. For switchgear connections. In ratings 600 v through 6000 amp; 5, 7.5 or 15 kv through 5000 amp.

Unit substations. I-T-E primary and secondary unit substations can be supplied for any application—indoor and outdoor—and in any standard rating.



Low voltage switchgear. Ratings through 600 v a-c, 250 v d-c, 6000 amp continuous, 15,000 through 150,000 amp interrupting.



Individual breakers. I-T-E large air circuit breakers are available in a wide range of types and ratings, 600 v a-c, 250 v d-c, 750 v d-c.

NEW CONSTRUCTION ECONOMY TIP: BUY AN I-T-E "POWER PACKAGE"

Coordinated engineering, delivery and installation means a better investment

An I-T-E "power package" includes the complete power handling facilities you need for a new construction project, building addition, or simple expansion of electrical service—one unit or a complete system for application from generation to end use. You save many ways:

Sound planning. Talk with your local I-T-E application engineer about your general power requirements before you build. He'll work with you to determine the equipment needed to assure complete protection with greatest economy in total investment, operating costs, and construction time.

Easier installation. Before you begin construction, I-T-E will supply you with arrangement and channel base drawings. Equipment is factory assembled, tested and ready to install. Standardized frames and panel elements assure that future additions to your switchboard will match and line up.

Coordinated delivery. Shipments are made from I-T-E according to a predetermined schedule. Each part of the complete "power package" is delivered to the job when needed. This saves delays and eliminates inconveniences.

Assured performance. Since I-T-E will supply all equipment—pre-engineered—you are saved the work of coordinating equipment of different manufacture. You can be sure that the separate parts of an I-T-E "power package" will fit and function together.

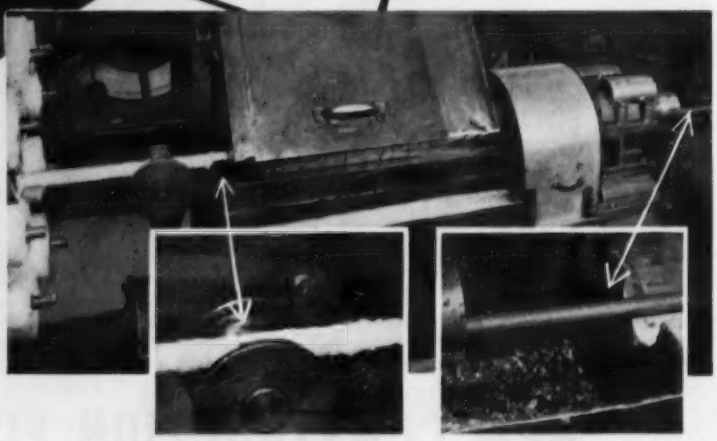
For details, contact the I-T-E sales office nearest you—look in your classified directory under "Electric Equipment." I-T-E Circuit Breaker Company, 19th & Hamilton Sts., Philadelphia 30, Pa.

I-T-E CIRCUIT BREAKER COMPANY
Switchgear Division

look beneath the braid

...that's where quality begins

the seamless construction of Rockbestos A.V.C. means lower long-range cost through long, dependable service



Heavy, felted asbestos walls are applied over and under the varnished cambric tapes . . . then thoroughly impregnated

. . . then the impregnated asbestos is compressed to a dense, homogeneous wall that ensures long cable life.

N.E.C. Type AVA wires or cables may look alike on the surface. But the proof of their quality is *under* the braid. Look for the dense, uniformly-impregnated, seamless walls of *Rockbestos A.V.C.* Type AVA.

The dense, felted, thoroughly-impregnated asbestos walls of *Rockbestos A.V.C.* seal the varnished cambric tapes away from air or moisture. This seamless construction gives *Rockbestos A.V.C.* added strength against damage from flexing. Heat dissipation is uniform. Dielectric strength *stays* high under conditions of high ambient temperature or moisture.

Complete construction and test specifications of *Rockbestos A.V.C.* Type AVA are in the new booklet: "Specifications RSS-88". Write for your copy.

STOCKED COAST TO COAST
Standard Rockbestos A.V.C. construction (N.E.C. types AVA, AVB, etc.) are available for immediate shipment. Call or write nearest branch office.

ROCKBESTOS PRODUCTS CORP.
NEW HAVEN 4, CONNECTICUT

NEW YORK • CLEVELAND • DETROIT • CHICAGO • PITTSBURGH • ST. LOUIS • LOS ANGELES • NEW ORLEANS • OAKLAND, CALIFORNIA

5 Current Ratings in 1 Regulator

Vari-Amp Feature Now Available on Distribution Regulators

YOU GET MORE USES FROM A SINGLE REGULATOR now that Allis-Chalmers provides increases in current ratings of as much as 60%. The *Vari-Amp* feature provides convenient stops that limit the range to let you handle more load.

The *Vari-Amp* feature provides considerable flexibility. You can reduce ranges in 1¼% steps from ±10% down to ±5%, increasing current-carrying capacity in steps up to 160%. Range need not be equal in both directions. Set what you need — for example, 6½% raise at 135% current, 10% lower at 100% current.

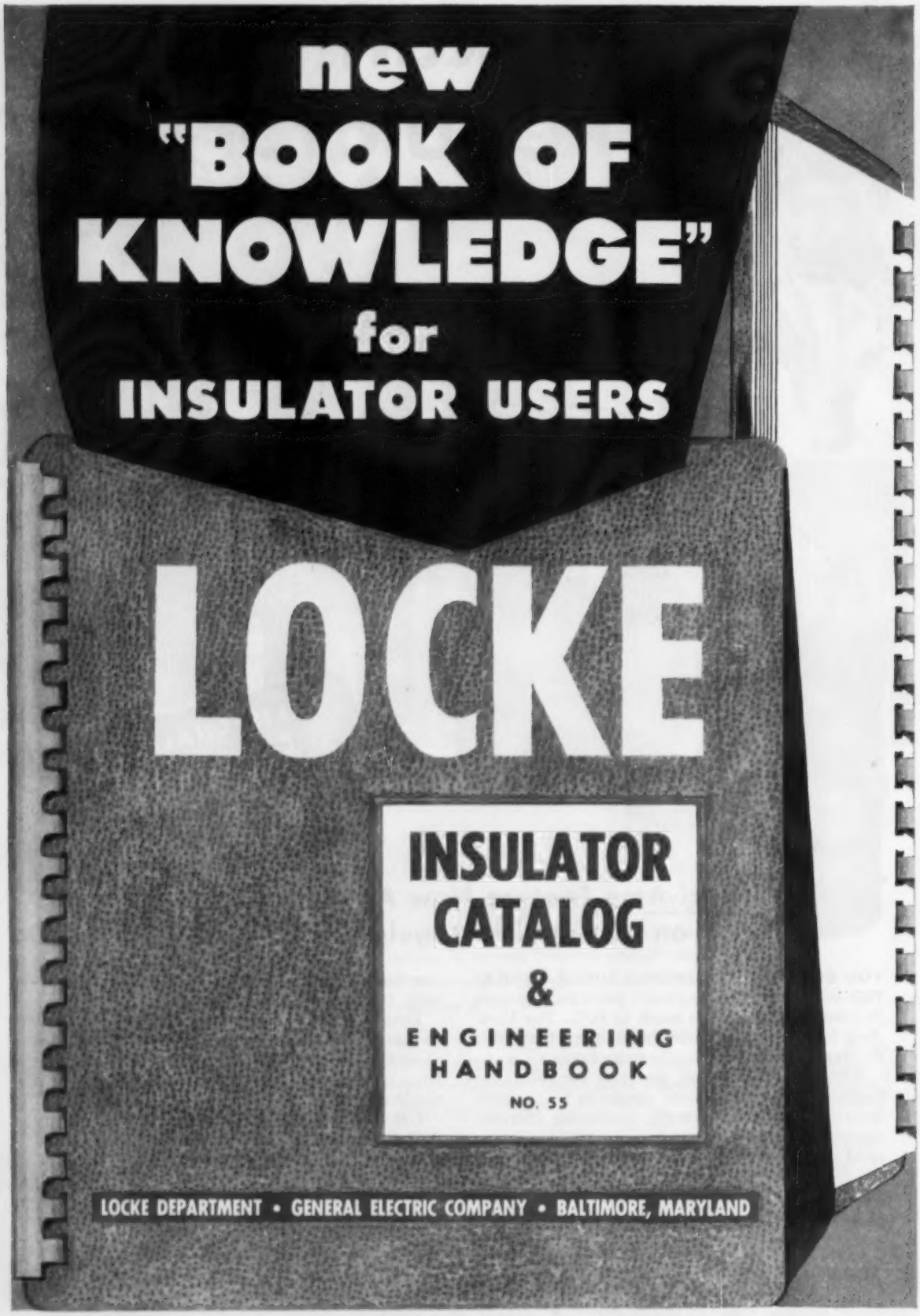
Best of all, this convenient feature that gives so many more uses for a voltage regulator comes at no extra cost. It gives you more for your regulator dollar because you get a lot more from a single regulator.

Get the complete story by calling your nearby A-C district office. Or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

A-4803

Originators of 5/8% Step Regulation

ALLIS-CHALMERS


new
"BOOK OF KNOWLEDGE"
for
INSULATOR USERS
LOCKE
INSULATOR CATALOG
&
ENGINEERING HANDBOOK
NO. 55
LOCKE DEPARTMENT • GENERAL ELECTRIC COMPANY • BALTIMORE, MARYLAND

Locke's Insulator Catalog and Engineering Handbook

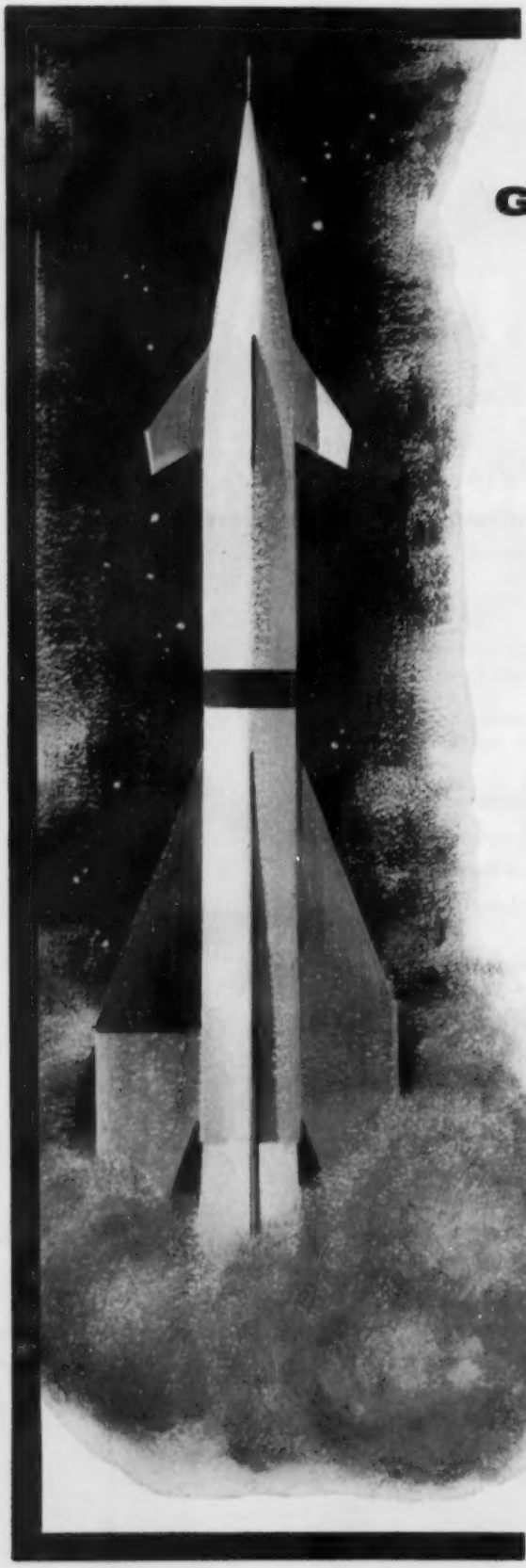
Designed to become your favorite source for complete, authoritative purchasing and engineering information on insulators and insulator hardware.

Included in its 233 pages of easy-to-use, alphabetically and numerically indexed material, you'll find these important features:

1. A completely new insulator product section, thumb indexed, makes it easy for you to quickly locate any one of over 800 insulators or insulator hardware items.
2. Complete description of physical characteristics of porcelain.
3. Six pages of clamp recommendations for various conductors.
4. Large section on lightning performance of transmission lines.
5. An expanded section on apparatus bushings with application and maintenance information.
6. Complete listing of all EEI-NEMA Standards, including proposed standards for apparatus insulators. (TDJ-58, 59)
7. The complete American Standards for apparatus bushings and test code.
8. A large general data section including standard insulator tests, cable specifications and many valuable tables for general calculations.

Your copy of this lightweight, spiral bound Insulator Catalog will be supplied by your local Locke Representative.

LOCKE



GOING UP!

...with Sylvania transformers sealed in "Scotchcast"

In a matter of seconds, rockets leave searing hot desert heat for freezing upper-atmosphere temperatures! That's one of the many reasons why Sylvania Electric Products, Inc., chose "SCOTCHCAST" for their new sealed-in-resin transformers used in many types of new military missiles and aircraft.

Wherever rigid military specifications call for insulated electrical components, one of the "SCOTCHCAST" Resins will do the job.

These epoxy-type resins, products of 3M Research, cure into a solid, shock-resistant, moisture-resistant insulation. And "SCOTCHCAST" sticks tight to most metals, plastics and conductors—is unaffected by acids, alkalies, solvents, oils and extremes of temperature.

A quick look at the features of these new Sylvania transformers shows many advantages gained by the use of "SCOTCHCAST":

MIL-T-27 GRADE 1 CLASS A
100K-200K Megohms IR values
after complete Mil-T-27 testing
Dielectric Strength: 1500 V/Mil
Extreme temperature range:
-65°C to 110°C
Reduced weight
Good thermal properties
High impact strength
Versatile shapes and mountings
Fungus proof
Permanent hand-etched marking
Non-inflammable
Minimum space

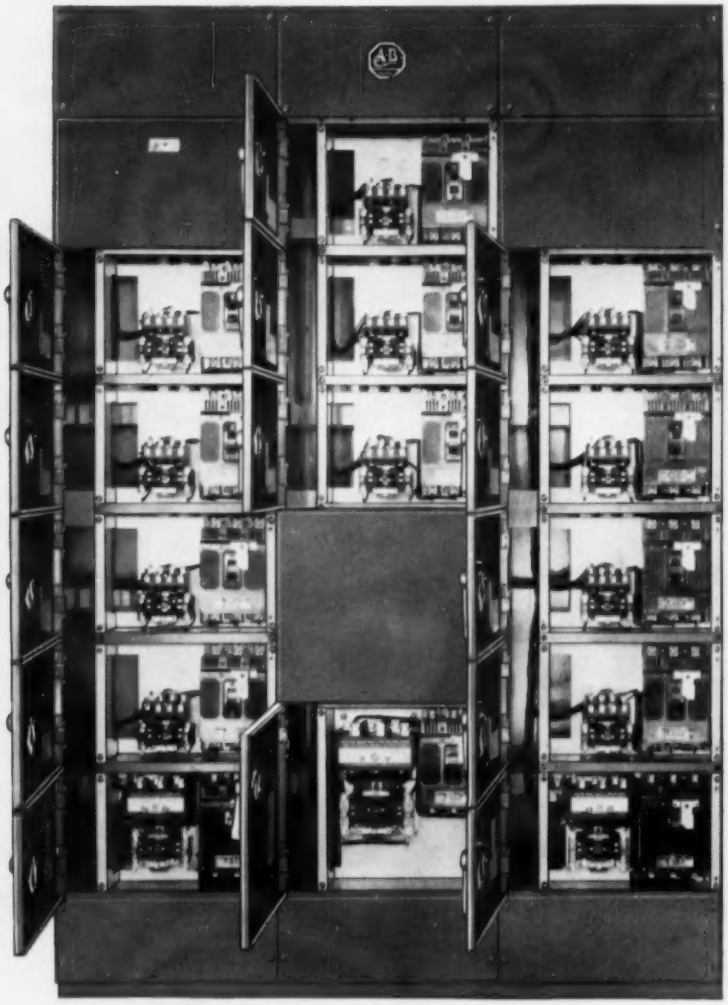
For more information on what "SCOTCHCAST" Resins can do for *you*, write Minnesota Mining and Manufacturing Co., Dept. BU-115, St. Paul 6, Minn.

TRADEMARK
SCOTCHCAST
BRAND
RESIN

PRODUCT OF 3M RESEARCH

The term "SCOTCHCAST" is a registered trademark of Minnesota Mining and Manufacturing Co., St. Paul 6, Minn. Export Sales Office: 99 Park Ave., New York 16, N.Y. In Canada: P.O. Box 757, London, Ontario.

3M



Allen-Bradley Control Centers

Into these multi-unit control centers is engineered all of the quality for which Allen-Bradley controls have earned their established reputation. The complete story is told in our 28-page bulletin on Allen-Bradley Multi-unit Control. It is a handy guide that will answer your questions about the various standardized units that will usually fit your specific motor control requirements.

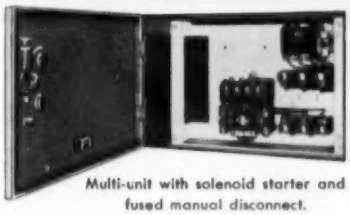
Manual or automatic motor starters, reversing switches, relays, timers, circuit breakers, autotransformers, pilot lights, push buttons—all are built into sectionalized Allen-Bradley units, listed and described in Bulletin 798. Send for it, today.

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.
In Canada—Allen-Bradley Canada Ltd., Galt, Ont.

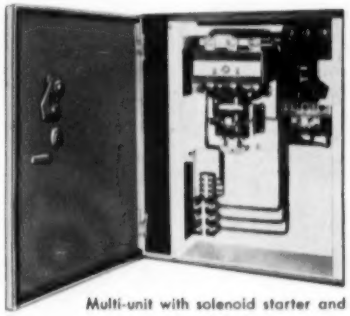
ALLEN-BRADLEY
BULLETIN 798 MULTI-UNIT CONTROLS
QUALITY

ALLEN-A-B BRADLEY

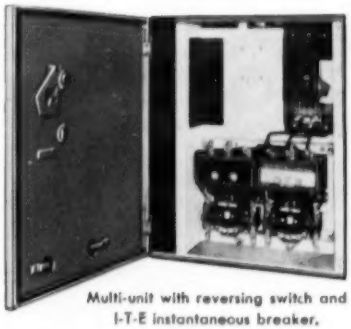
A few of the many standard units available for A-B Control Centers . . .



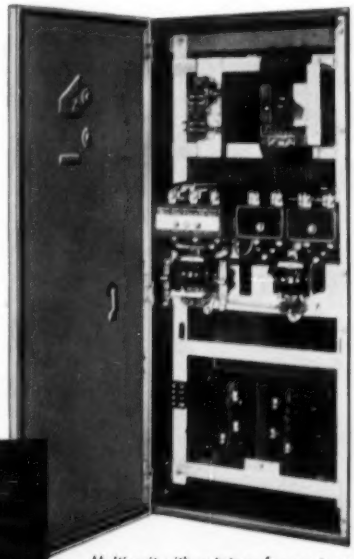
Multi-unit with solenoid starter and fused manual disconnect.



Multi-unit with solenoid starter and circuit breaker.



Multi-unit with reversing switch and I-T-E instantaneous breaker.



Multi-unit with autotransformer-type automatic motor starter.

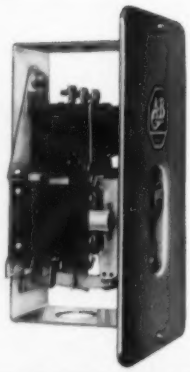
8-55-M

The Quality Line
of Manual Motor Starters

GENERAL PURPOSE

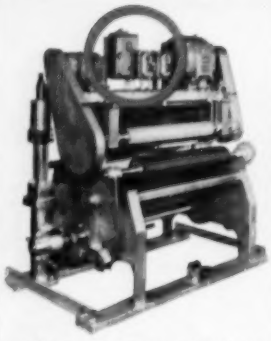
WATERTIGHT

EXPLOSION-PROOF

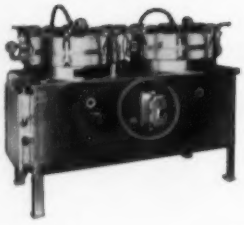


FLUSH TYPE

A-B manual starter, in NEMA 1 general purpose enclosure, on DeWalt metal cutter.



A-B manual starters, in NEMA 4 watertight enclosures, on Stehling fleshing machine.



A-B manual starter, in NEMA 7 explosion-proof enclosure, on Hilco oil reclaimer.

A-B manual starter, in Type 1B1 flush mounting, on Noble & Westbrook shell marker.

The popularity of Bulletin 609 manual starters rests on the following facts!

1—They are so simple. Few moving parts mean few chances for trouble.

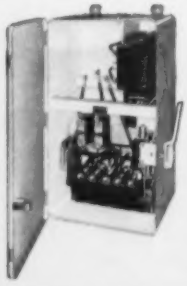
2—Quick-make and quick-break switching action prevents contact "teasing."

3—Double-break, silver alloy contacts need no cleaning or filing—they are always in perfect operating condition.

4—Use of "buttons" for ON and OFF switching is in line with operation of automatic starters and is convenient for machine operator.

5—The two solder-pot overload breakers provide continuously dependable and accurate motor overload protection.

Be sure to send for a bulletin describing the full line of A-B Bulletin 609 manual across-the-line starters up to 5 hp, 220 v; 7½ hp, 440-550 v.



Bulletin 646 autotransformer starter.

8-55-MR

Allen-Bradley Co.
1316 S. Second St.
Milwaukee 4, Wis.

In Canada—
Allen-Bradley Canada Ltd.
Galt, Ont.

A-B Quality

ALLEN-BRADLEY
SOLENOID STARTERS
QUALITY

FEDERAL MICROWAVE—"CERTIFIED BY A WORLD OF RESEARCH"

Communication that's so right for right-of-way companies

Why is microwave communication so economical? The main reason is: it is *physically discontinuous!*

Between antennas... tens of miles apart... no legal right-of-way must be negotiated and purchased... no pole-line raised... no wires strung. Microwave installations made throughout the world by companies of International Telelphone and Telegraph Corporation prove these facts to be of major importance... especially where circuits must traverse cities, rivers, bays, swamps, deserts, jungles, and mountain ranges.

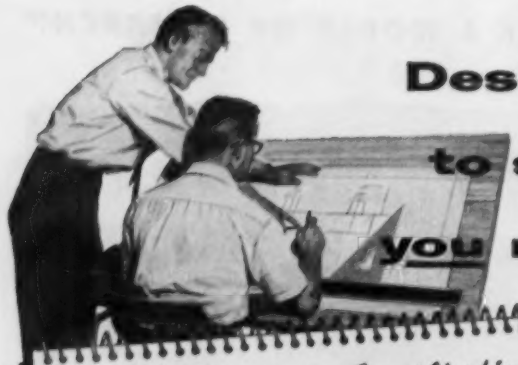
Matching the rightness of microwave for right-of-way companies is the simplicity, flexibility, versatility, and dependability of *Federal* Microwave... developed cooperatively by IT&T microwave specialists in 10 countries and proved-in by installations in the United States and 16 countries around the globe.

Today, pipelines, power utilities, railroads, airlines, telephone, and other right-of-way companies... whatever their circuit requirements... can look with confidence to the quality and performance of *Federal* Microwave... the system that's *"Certified by a World of Research!"*

Federal

A DIVISION OF IT&T

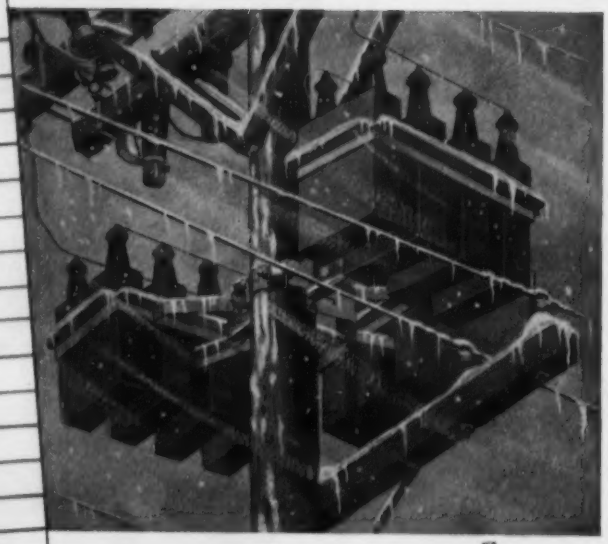
Federal Telephone and Radio Company
A Division of INTERNATIONAL TELEPHONE AND TELEGRAPH CORPORATION
100 KINGSLAND ROAD • CLIFTON, NEW JERSEY
In Canada: Standard Telephones and Cables Mfg. Co. (Canada) Ltd., Montreal, P. Q.
Export Distributors: International Standard Electric Corp., 67 Broad St., New York



Designed and built to specifications you might have written...

Power Capacitor Specifications

1. Corrosion protection – even though case finish is scratched.
2. Solder-sealed porcelain bushings.
3. Reliable performance at low ambient temperature.
4. Suitable for vertical or horizontal mounting.
5. Low losses.
6. Low temperature rise.
7. Stability under all operating conditions.
8. Terminal connectors for either copper or aluminum.



SANGAMO POWER CAPACITORS

Perhaps *you* were one of the many utility men Sangamo engineers talked to before starting to build "the power engineer's capacitor." In these talks we found out you wanted not only a capacitor that will release system capacity, raise system voltage and reduce system losses – but one that will do these things under all operating conditions.

The reason for the Sangamo Capacitor's reliable operation in low surrounding temperatures is Sangamo Diaclor, the high-strength, low-loss liquid dielectric which completely fills the capacitor. This characteristic permits switching of capacitor banks even after long periods of de-energization at low ambient temperatures.

So no matter what winter brings—snow, ice, freezing rain—even 40 degrees below zero, Diaclor enables Sangamo Capacitors to go right on doing their jobs just as though it were a mild spring day.

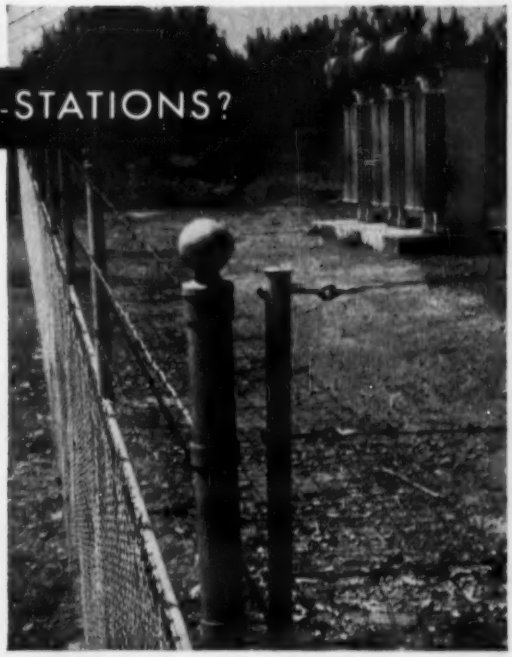
For more details, write today for Bulletin 1120.

PC85-6

SANGAMO ELECTRIC COMPANY

SPRINGFIELD, ILLINOIS

WEEDS AROUND SUB-STATIONS?



"Telvar" is ideal for weed control around fences, poles, towers. It's low in toxicity to humans and animals, non-volatile, non-flammable and non-corrosive to equipment.

One application of

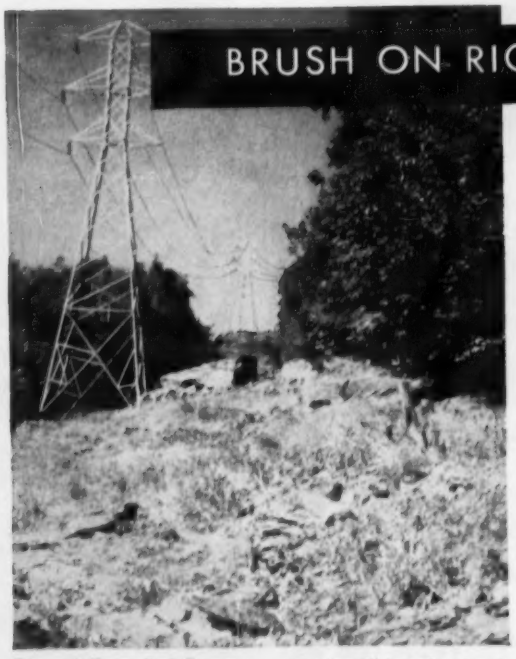
Du Pont Telvar®

WEED KILLERS

stops weeds for the season—or longer!

"Telvar" kills weeds through the roots . . . prevents regrowth. Low rates (20 to 80 lbs. per acre) make it cost little for the results you obtain . . . also mean less handling, fewer storage problems. To cut maintenance costs to new low levels, put "Telvar" in your weed-control program. Available in two formulations: "Telvar"W, and "Telvar" DW.

BRUSH ON RIGHT-OF-WAY?



"Ammate" applied five years ago, is still keeping brush down along this right-of-way. "Ammate" allows low-growing cover to return to resist erosion.

One application of

Du Pont Ammate X®

WEED AND BRUSH KILLER

kills more kinds of brush —safely—at lower cost!

"Ammate" X kills more kinds of brush and keeps it down longer than most weed and brush killers! When the original spray job is done well, brush is kept under control for years with only an occasional spot spray. You can rely on "Ammate" X to do the job safely, even where your right-of-way adjoins cropland, because "Ammate" X is not volatile. There are no vapors to drift onto sensitive crops. It is no hazard to crews, stock or wildlife.

FREE ILLUSTRATED BOOKLET (A-139) describes season-long weed control with "Telvar." Shows results in West Coast areas. For your copies, write to Du Pont, Grasselli Chemicals Dept., 111 Sutter St., San Francisco 4, Calif.

On all chemicals always follow directions for application. Where warning or caution statements on use of the product are given, read them carefully.

Telvar® Weed Killers for industrial use

DU PONT REG. U.S. PAT. OFF.

Ammate X® Weed and Brush Killer

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

6 PM
4 PM
3 PM
WESTINGHOUSE ELECTRIC CORP. MADE IN U.S.A. TYPE 44 INSTRUMENT CHART
Style No. 172817
Lot DXE K1

Helping the industry meet its growing loads

Designing instruments to help management make sound decisions

Electric utility managements continually face the urgent question, "How do we improve present system efficiencies and intelligently plan for future capacities?"

To be of true value, their answer to that question must be founded upon accurate, up-to-date information about their own particular operations.

Westinghouse has long anticipated that today's swiftly paced expansion in power systems would accentuate the need for accurate recorded information, a basic foundation in making sound management decisions. Needs of the industry were surveyed, and one timely answer to the kind of instruments desired now appears in the new Westinghouse line of strip chart recorders—the Type 44.

Operational efficiencies and economies are studied by means of the recording voltmeters. Recording varmeters show where the power is being wasted and corrective measures are needed. Recording wattmeters and ammeters give you the information necessary to plan for load growth, proper distribution, and the addition of generating equipment and distribution facilities.

All of these new recording instruments can help you cut costs, develop more reliable operation, make better planning decisions for the future. Indirectly, they will also help you maintain stability and continuity of service, thereby protecting customer good will.

The Type 44 recorder is another example of Westinghouse contributions to electric equipment pioneering. Westinghouse makes a full line of electric measuring instruments for every electric utility requirement—will gladly help you apply them to your instrumentation systems.

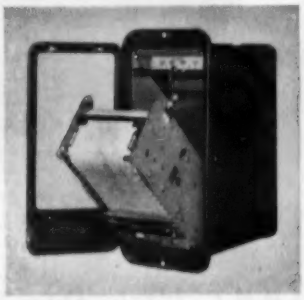
J-97191

YOU CAN BE SURE...IF IT'S

Westinghouse

Greater Accuracy

New, iron-core measuring mechanisms develop twice the torque of previous designs . . . provide faster response, accuracy within 1% under all operating and load conditions.



Ease of Use and Service

All parts are fully accessible from front of recorder, a particular advantage in flush switchboard mounting.

Versatility

Used to make operation and load studies in electric power generating stations, substations, field surveys, and in field service. Also used in industrial applications to check machine performance and factory distribution systems.

Less Mounting Space

Recorder has highest ratio of scale width to panel area, is attractive in appearance and easy to read.

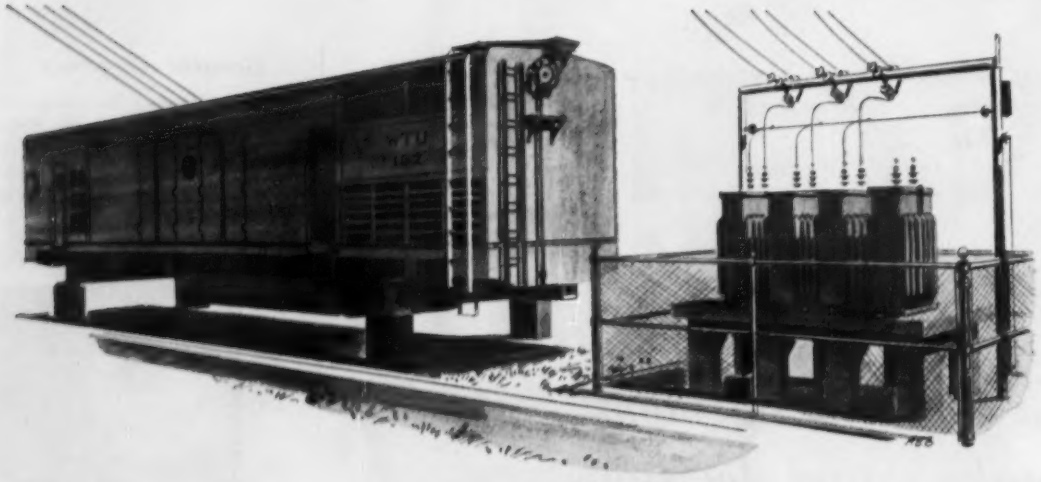
Economy

Less maintenance, long charts last 70 days . . . large ink capacity permits operation for greater unattended periods.

Dependability

Extremely high overload capacity reduces possibility of burnouts. All mechanisms self-shielded against stray magnetic fields.

For more information on Type 44 recorders, call your Westinghouse representative or write direct to Westinghouse Electric Corporation, 3 Gateway Center, P. O. Box 868, Pittsburgh 30, Pennsylvania.



1000 kw. at local load relieves central generating station of 1300 kw. during time of peak.

The West Texas Utilities Company has placed an Electro-Mobile power car in service 125 miles from a central generating station. This unit, equipped with automatic control, provides 1000 kw. right at the point of need for peaking, better continuity of service, and voltage regulation.

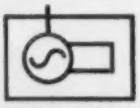
It can be moved swiftly and economically to any point to fill an unusual or emergency demand.

This versatility of the Electro-Mobile power car makes it the practical answer to many electric utility problems.

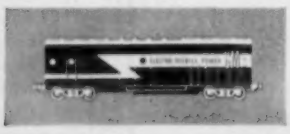
For complete information write to:

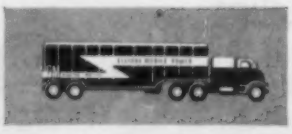
ELECTRO-MOTIVE DIVISION

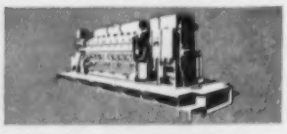
GENERAL MOTORS • La Grange, Illinois



Rail car, truck trailer and portable units—350 to 1,000 kw.







Sold and serviced directly through a manufacturer's organization. Electro-Motive Division offices located in: New York City, Chicago, Jacksonville, St. Louis and San Francisco. In Canada: GENERAL MOTORS DIESEL, LTD., London, Ontario.

You can pull these plugs at full load . . . SAFELY!

Circuit-Breaking Arktite

PLUGS AND RECEPTACLES

20 amp. to 400 amp.—250V D.C.; 600V A.C.

SAFE at all times—even if you pull an *Arktite* plug to disconnect an energized motor or appliance in an emergency!

You don't have to open the disconnect switch before withdrawing an *Arktite*. Arcs created as line and load poles disengage are confined in deep, insulated arcing chambers—are instantly snuffed out by pressure-deionization and lack of oxygen. There's no possible danger of flashover injuring personnel or destroying property.

Contact your Crouse-Hinds Distributor, nearest Crouse-Hinds Office or Representative for complete information.

NEW, Re-Designed *Arktites* . . .

Feature new pressure connectors — new easier-to-wire 1-piece interior assemblies — new easier-to-interchange plug and receptacle interiors — new plug adaptability to any type and size cable.

Fully interchangeable with older style. Same price. Currently available in 30 and 60 amp. sizes, in 2-, 3- and 4-poles.

Operated like a giant switchboard, this *Arktite* installation with variations in power, frequencies and voltages is used to speed up machine tool testing. Plugs can be inserted and withdrawn from "live" receptacles without using a disconnect switch.

A NATIONWIDE DISTRIBUTION exclusively through ELECTRICAL DISTRIBUTORS

CROUSE-HINDS COMPANY

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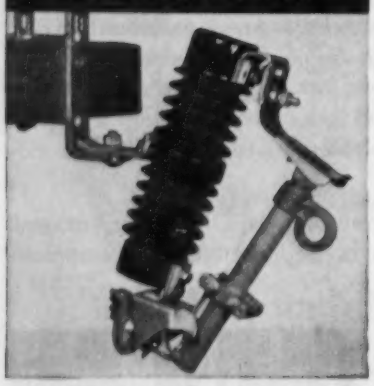
CONDULETS • FLOODLIGHTS • TRAFFIC SIGNALS • AIRPORT LIGHTING

NEW HEAVY-DUTY RATING

4000-AMP INTERRUPTING RATING of new 15-kv, 100-amp unit extends range of application of open drop-out cutouts to more points on the distribution system.

HEAVY-DUTY RATING



5000-AMP INTERRUPTING RATING is provided by 7.8-kv, 100-amp unit. Like 15-kv unit it features heavy-duty fuse holder, can be equipped with 100-amp load break or 200-amp disconnect blade.

Now . . . 15-kv, heavy-duty interrupting rating added to G-E open drop-out cutout line

New unit has 4000-amp rating also available with load break

Now you can provide *more dependable* yet *economical* overcurrent protection of equipment *at more points* along your distribution system where the advantages of open-type cutouts are needed, with a General Electric open drop-out cutout.

HEAVY-DUTY RATINGS include the new 15-kv, 100-ampere cutout with an interrupting rating of 4000 amperes and the previously available 7.8-kv, 100-ampere unit with a 5000-ampere interrupting rating.

STANDARD-DUTY RATINGS include the 7.8-kv, 100-ampere unit with its interrupting rating of 3000 amperes plus the 15-kv, 100-ampere unit with a 2000-ampere interrupting rating.

ALL UNITS can be provided with 200-ampere disconnect blades. And all offer the many outstanding design features that have always made G.E. your best cutout buy . . . interchangeable fuse holders in each voltage rating . . . silver-plated contacts . . . birdproof construction . . . compression clamped top and bottom fittings and hanger support . . . permanent high-pressure contact and latch . . . "can't miss" hinge guides . . . and many others.

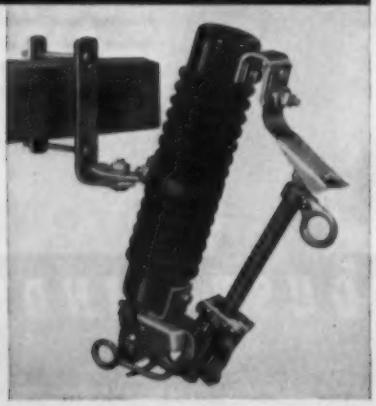
For complete information on these open drop-out cutouts, contact your nearest G-E Sales Representative, or write to General Electric Company, Section 433-14, Schenectady 5, New York.

Progress Is Our Most Important Product

GENERAL ELECTRIC

STANDARD-DUTY RATINGS

3000-AMP INTERRUPTING RATING of 7.8-kv, 100-amp unit meets NEMA standards. Interchangeable with 7.8-kv heavy-duty fuseholder.



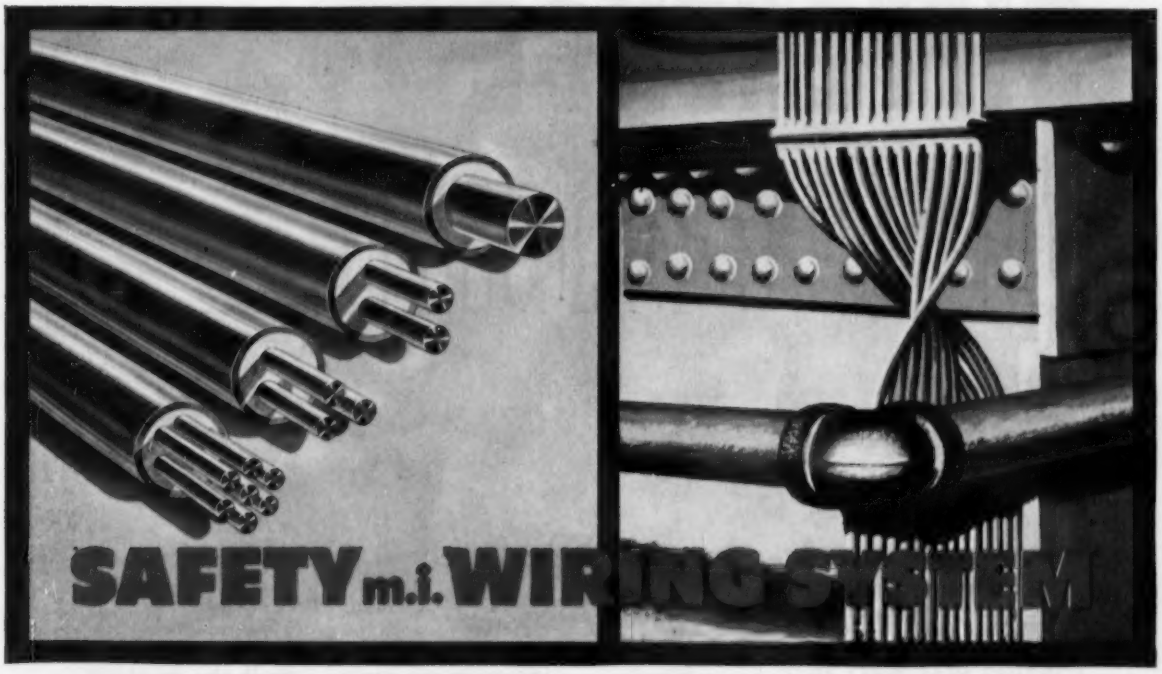
2000-AMP INTERRUPTING RATING of 15-kv, 100-amp unit has been retained. It can be equipped with 100-amp load break device or 200-amp disconnect blade.

COMBINATIONS

COMBINATION of 7.8-kv open drop-out cutout and 9-kv Hi-stroke arrester can be purchased at less cost than units purchased separately.

GENERAL CABLE

THE GREATEST NAME IN ELECTRICAL WIRE AND CABLE



A dramatic new advance in electrical wiring for all applications up to 600 volts and wherever heat, vapors, moisture and aging are problems. Safety m.i. Wiring is ideal for low voltage, lighting, power, control, machine tool and equipment uses.

The mineral insulation of Safety m.i. Wiring is physically stable up to 2800° Centigrade . . . will not burn, deteriorate, support combustion, or convey flame . . . provides extra safety in boiler rooms, around steam pipes, boiler stacks and other "hot spots." Simple fittings seal both ends of wiring runs . . . no possible entrance for moisture.

Underwriters' Approved Safety (Type m.i.) Wiring Systems offers lower installation and maintenance costs. Acts as its own conduit . . . can be installed in one operation with standard switch and junction boxes. Easily shaped on the job, Safety m.i. can be fastened with standard clamps or straps . . . stays put permanently!

Save time and money! Get a neater job! Simplify planning! Ask your General Cable Representative for all the facts about Safety m.i. Wiring Systems. Remember, too, General Cable is the *only* manufacturer who can supply *all* your wire and cable needs!

GENERAL CABLE
CORPORATION

BARE, WEATHERPROOF, INSULATED WIRES and CABLES FOR EVERY ELECTRICAL PURPOSE

GENERAL CABLE CORPORATION
Executive Offices: 420 Lexington Ave., New York 17, N. Y.

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Look at the DIFFERENCE DROP FORGING_____ makes

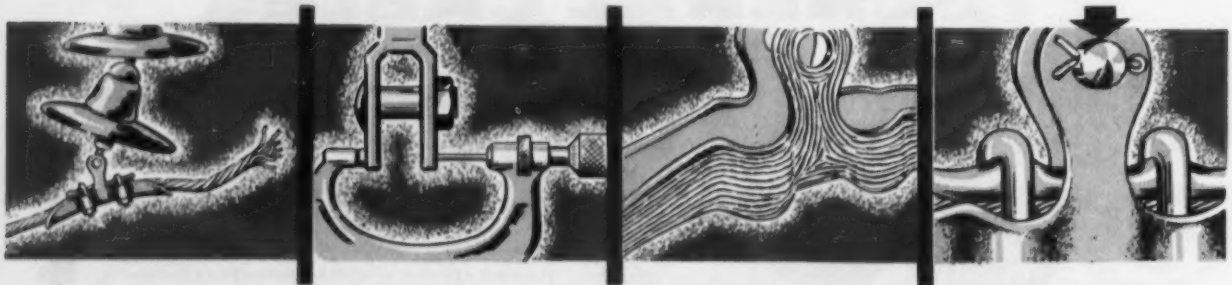
Comparison shows why it pays to specify BTC Drop-Forged Hi-Line Hardware

FORGING WAS FIRST USED by prehistoric man to shape metals to usefulness. Today, it's employed not only to shape metal but to impart strength, lightweight and uniformity of structure as well. The repeated blows of the forging hammer, press or upsetting machine refine the grain structure, toughen the metal.

Brewer-Titchener was first to introduce a standardized line of drop-forged high voltage transmission line hardware. Today, BTC offers a complete line of drop-forged parts and assemblies for your use.

Closed die forging gives BTC Hi-Line Hardware greater strength and soundness, in addition to finer finish and closer dimensional fidelity than can be obtained by other processes. Through forging, BTC Hardware acquires a uniform, fibrous, close-grained structure . . . with the grain flow advantageously following the contour of the part. This results in superior mechanical strength plus the ability to withstand severe loading, sudden shock and frequent reversal of stress as well as to prevent excessive wear on flexibly connected load-bearing surfaces.

Forging permits BTC to design parts and assemblies with lighter sections without sacrificing desired strength. BTC Forged Steel Hardware, for example, may be heat-treated to increase strength up to 50% without adding undesirable mass and weight. All BTC Forged Aluminum Alloy Conductor Clamp Parts are fully heat-treated. The more-than-adequate catalogued strength ratings of BTC Hardware are conservative and are exceeded in actual tests.

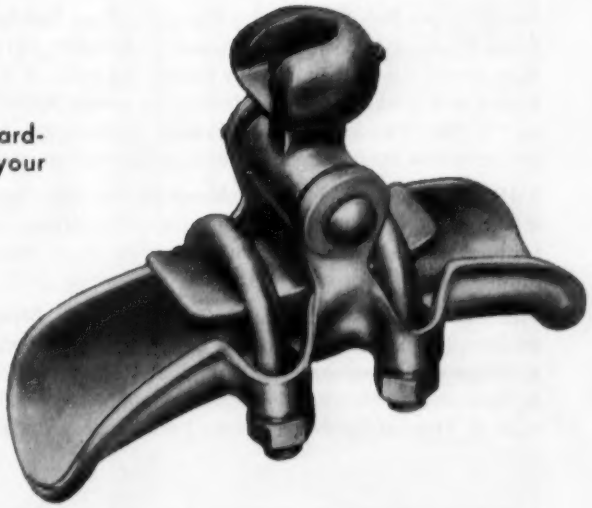


Withstands sudden shock | Closer dimensional accuracy | Strength in contour structure | Resists wear on load-bearing surfaces

CAST CLAMP
Metal has no fibrous structure. Lower yield and tensile strengths . . . heavier sections necessary in critical areas . . . undesirable extra weight.

BTC FORGED CLAMP
Fibrous grain structure of metal conforms with shape of clamp . . . making clamp stronger, tougher, while permitting lighter-weight design.

NEW BTC CATALOG!
Latest, revised edition of BTC Hi-Line Hardware Catalog now off the press! Write for your **free** copy.



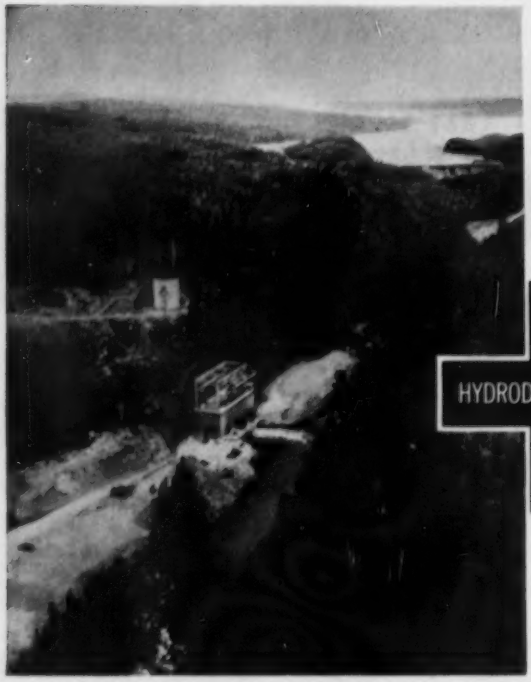
BTC

Specify

DROP-FORGED Hi-Line Hardware

. . From Your Insulator Manufacturer

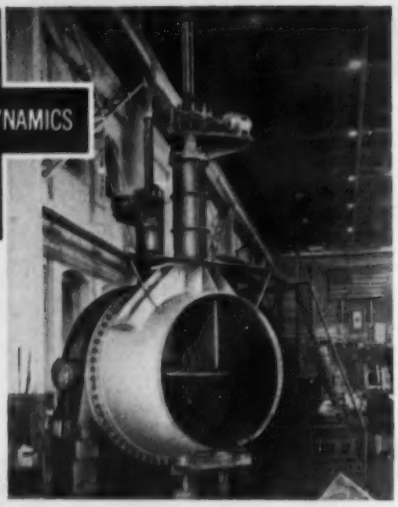
THE BREWER-TITCHENER CORPORATION, Cortland, N. Y.



A 16-foot diameter tunnel leads from Ripogenus Dam to the surge tank, from which two penstocks feed the McKay Station turbines. Each turbine has a plate steel spiral case, shop welded in two halves with riveted butt strap connections. SMS accessory equipment is installed at the dam and in the station. Consulting Engineers: Stone and Webster Engineering Corp.

SMS intake gate is installed at the left end of the dam. The 10-foot trash rack rake and self-contained trash car are shown (above) in lowering position above the center rack. Upper left photo shows rear view of the hoist support and trash car, with the 60,000 lb. intake gate hoist in the foreground.

HYDRODYNAMICS



Motor-operated Dow valves, installed at the inlet of each spiral case, provide tight shut-off. Note the streamlined valve disc and housing around operating link connection to the disc.

SMS TURBINES POWER RIPOGENUS EXPANSION

On the upper Penobscot River, Ripogenus Dam had been a storage reservoir for Great Northern Paper Company's downstream power plants since 1916. When studies made in 1950 indicated more power was needed, McKay Station was built. A 4,000-foot, rock-lined tunnel, leading from a new intake in the dam face to the power house below, created a net effective head of 175 feet. Two vertical SMS-Francis turbines, rated at 16,590 hp, were installed, and provision made for the ultimate addition of another unit.

SMS hydraulic equipment was chosen for the entire project. The 18 x 20-foot fixed wheel turbine intake gate is operated by a twin-drum, motor-driven chain hoist. A special log-grapple type trash rack rake keeps the intake free of pulp wood and other debris. Two 108-inch SMS-Dow valves provide shut-off at the turbine inlets.

This Ripogenus hydroelectric expansion typifies S. Morgan Smith's ability to satisfy the complete needs of any project. Over 75 years of world-wide experience in design and manufacture of hydraulic turbines and accessories assures you of equipment that will meet the highest standards. For full information, write S. Morgan Smith Company, York, Pennsylvania.

SMS

S. MORGAN SMITH

AFFILIATE: S. MORGAN SMITH, CANADA, LIMITED, TORONTO

HYDRAULIC TURBINES
PUMPS
GATES & HOISTS
TRASH RAKES
ACCESSORIES

HYDRODYNAMICS

ROTOVALVES
BALL VALVES
BUTTERFLY VALVES
FREE-DISCHARGE VALVES
CONTROLLABLE-PITCH SHIP PROPELLERS

Here's a secondary fuse that waves a RED FLAG to indicate outages . . .

you get low-cost secondary fusing *plus* semaphore indication with the . . .

MATTHEWS CTS* Fuse

Here is the answer to your need for inexpensive protective fusing for secondary systems.

Matthews CTS Fuses give complete protection to secondary systems from service entrance to primary—at a very low cost. They can be used to isolate secondary capacitors, protect transformers in radial secondary systems, protect banked transformers, isolate service faults and for sectionalizing.

Picture at right shows closed view of Matthews CTS Fuse. Overall length including conductor tails is twenty-one inches. Available in a range from 5 to 200 amp. rating.

Red Flag Indicates Outage. The red plastic indicator on the Matthews CTS fits tight against the fuse cartridge until the fuse element ruptures. The flag is then released and instantly springs away from the cartridge. Linemen can easily spot this semaphore signal from the ground.

Stays Intact After Operation. Matthews Secondary Fuses do not fall apart and hang down after they blow and therefore cannot short-circuit other lines.

Can Be Co-ordinated—Curves Available. For the greatest possible protection on the entire system, Matthews CTS Fuses can be co-ordinated with primary fuses. Curves showing minimum melting and maximum total clearing time current characteristics are available on request.

*Cartridge Type Semaphore

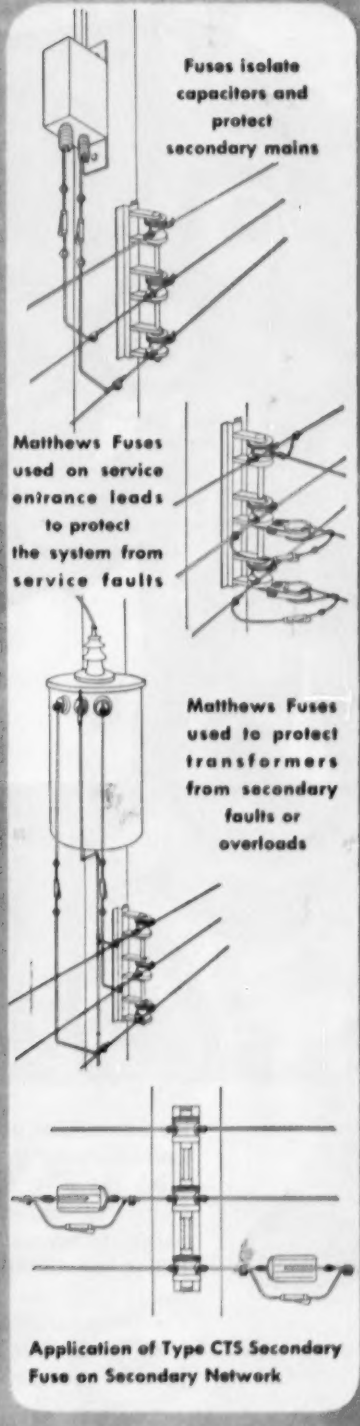
Send for complete information and performance curves today

A·B·CHANCE CO·

CENTRALIA, MISSOURI

SAN FRANCISCO, CALIFORNIA

HOW TO PROTECT SECONDARY SYSTEMS WITH MATTHEWS CTS FUSES

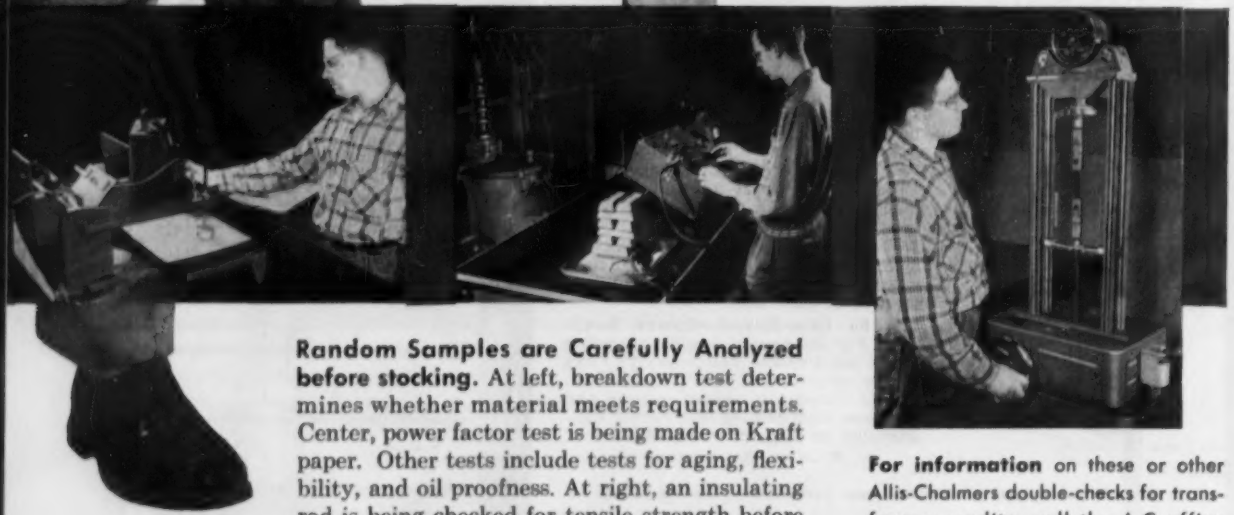

Fuses isolate capacitors and protect secondary mains
Matthews Fuses used on service entrance leads to protect the system from service faults
Matthews Fuses used to protect transformers from secondary faults or overloads

Application of Type CTS Secondary Fuse on Secondary Network

Suppliers Check...But Allis- to Assure

ALLIS-CHALMERS
POWER
Transformers

Suppliers Meet Rigid Specifications which are set by Allis-Chalmers engineers and checked by personal visits to supplier plants. Even so, additional tests are made when insulating material arrives at an A-C transformer plant. It is first checked visually and checked with micrometer to make sure exact dimensional requirements have been met.

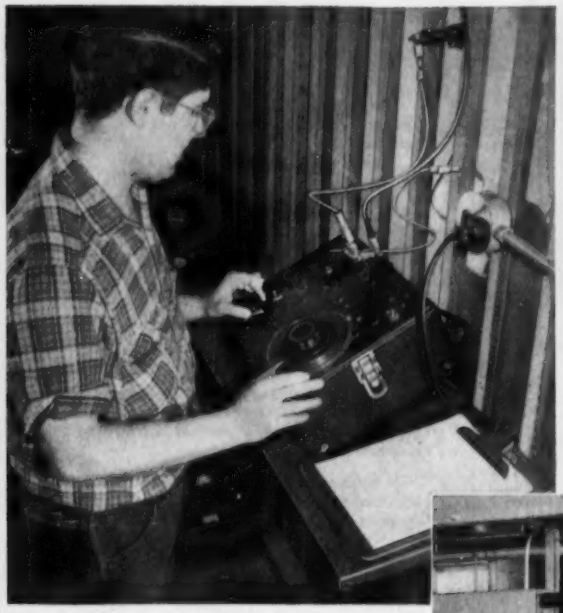


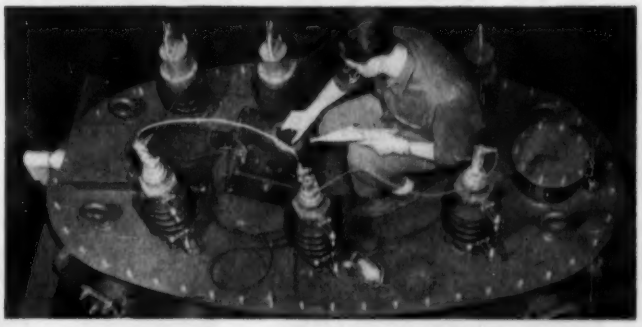
Random Samples are Carefully Analyzed before stocking. At left, breakdown test determines whether material meets requirements. Center, power factor test is being made on Kraft paper. Other tests include tests for aging, flexibility, and oil proofness. At right, an insulating rod is being checked for tensile strength before the shipment is sent to stock. If all or part of a shipment fails to meet any of these tests, it may be returned to the supplier immediately.

For information on these or other Allis-Chalmers double-checks for transformer quality, call the A-C office nearest you or write Allis-Chalmers, Milwaukee 1, Wisconsin. A-4763

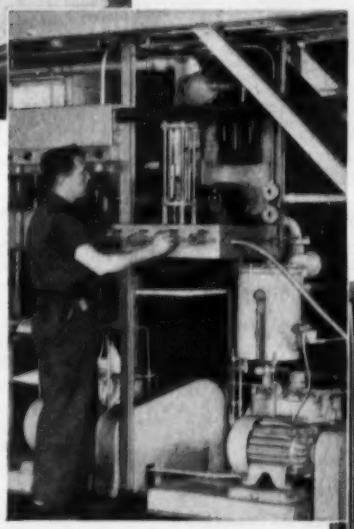
ALLIS-

Chalmers Double Checks Insulation Quality

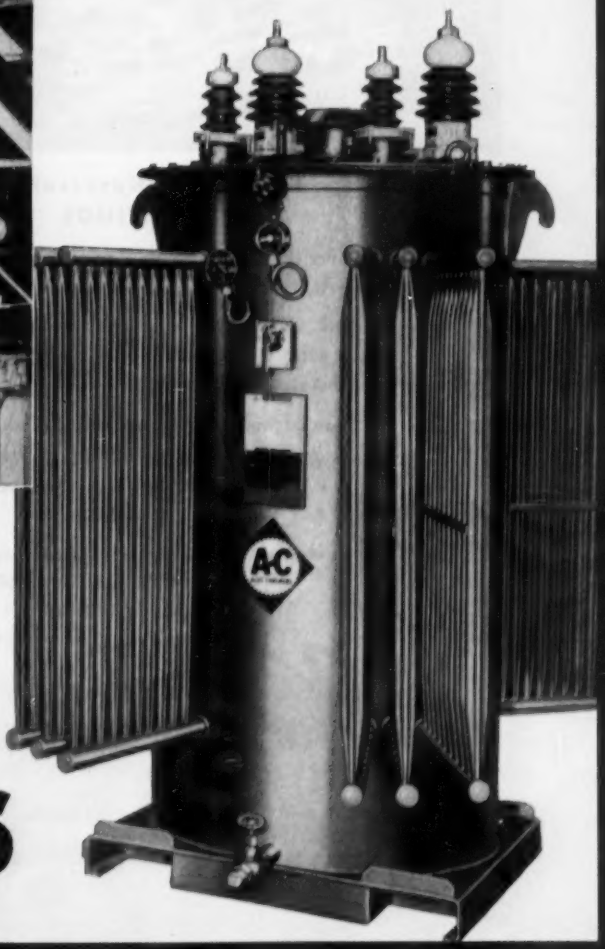




Utmost Dielectric Strength is Assured through use of degassed oil. Above, power factor test is made after transformer is tanked. Finally, below, completed transformer is given standard NEMA and ASA dielectric tests.



Tests Continue During Manufacture. Above: Insulation resistance tests are made on windings in oven before assembly is begun. After assembly, before it is immersed in oil, further resistance and power factor tests are made.



Oil is Degassed to secure thorough impregnation of insulation in special degassing equipment shown above. Oil is heated, sprayed into a vacuum chamber by high pressure jets which atomize it. Air dissolved in oil is then removed by low vacuum.

A-C ALLIS-CHALMERS

CHALMERS

IT HAPPENED BEFORE...
IT CAN HAPPEN AGAIN

Killark **ALUMALLOY FITTINGS...**

Installed and in Stock . . . Were Undamaged by WATER or RUST

No Flood Insurance Necessary With KILLARK FITTINGS

The recent floods of Diane found Killark Alumalloy fittings unaffected by water—because aluminum will not rust. Those Killark fittings that were in stock merely had to be washed off and reboxed. We were happy to supply new containers to our distributors.

You get these advantages, because only Killark Fittings:

- **WON'T EVER RUST OR CORRODE**
- **ARE MADE OF STRONG, DURABLE ALUMALLOY**
- **ARE SAFE and NON-SPARKING**

Contractors like them, too, because they're LIGHTWEIGHT— ROOMIER IN DESIGN, for EASIER SPLICING

Killark ELECTRIC MANUFACTURING COMPANY

Dallas, 1903 Griffin St.; **Denver,** 1073 Galapago; **Los Angeles,** 412 Seaton St.; **San Francisco,** 714 Harrison St.; **Seattle,** 4130 First Ave., S.; **Kansas City, Mo.,** 616 W. 26th St. **Canadian Representatives:** E. A. Adams, Griffon Sales, Ltd., 188 W. 5th Ave., Vancouver 10, B. C.; A. H. R. Louden Agency, 7608 88th Ave., Edmonton, Alberta.

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ENTRANCE FITTINGS • CONDUIT BODIES • FLUSH SWITCH FITTINGS
EXPLOSION PROOF FITTINGS • VAPOR TIGHT LIGHT FIXTURES
EXPLOSION PROOF LIGHT FIXTURES • SEALED BEAM FIXTURES

ELECTRICAL BOOKS

LAPLACE TRANSFORMS FOR ELECTRICAL ENGINEERS, *279 pages, 6x9, by B.F. Starkey, Philosophical Library, $10.*

Language used in this book is well known to engineers in general and the method of explaining the problems is particularly familiar to electrical engineers. With this combination, the author explains how to use the Laplace transformation theory to solve engineering problems.

COLOR TELEVISION FUNDAMENTALS, *312 pages, 6x9, by Milton S. Kiver, McGraw-Hill Book Co. Inc., $6.*

From a general discussion of light and color to a detailed description of complete servicing procedures for color TV receivers, this book progresses through the fundamentals of installing and servicing, as well as the basic principles. Easily understandable to anyone familiar with radio or black-and-white television, with no mathematics used in the text.

PROFESSIONAL DEVELOPMENT—THE RESPONSIBILITY OF INDUSTRY AND THE ENGINEER, *56 pages, 6x9, National Society of Professional Engineers, $4.*

This booklet carries a complete transcript of the recent conference on professional development held in Philadelphia. A final question and answer period is covered in detail.

ELECTROMAGNETIC MACHINES, *535 pages, 6x9, by R. Langlois-Berthelot, Philosophical Library, $15.*

The author is director of one of the most modern high-voltage laboratories in Europe, and a professor of electrical engineering at L'Ecole Superieure de Paris. His book relates the various kinds of electrical machines to each other, recognizing them as being of one family having a common basis of existence. Fundamental principles, not practice, are firmly established in the text.

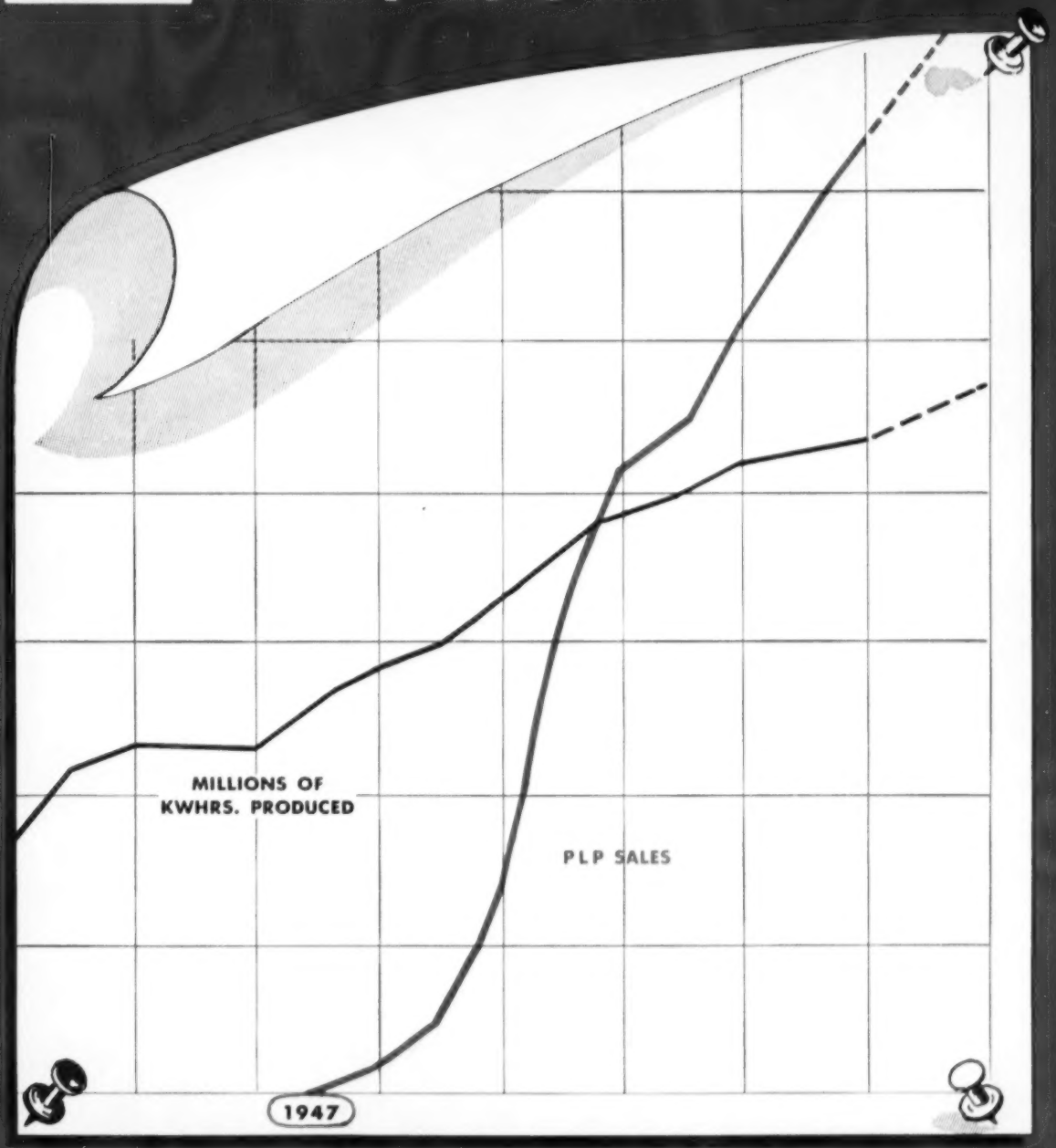
STATISTICS OF ELECTRIC UTILITIES IN THE UNITED STATES, 1953, PUBLICLY OWNED, *Office of Public Reference, Federal Power Commission, $3.*

This is the latest edition of the FPC publication on statistics of publicly owned electric utilities in the United States. Contains financial and operating information for the year 1953 on 302 classes A and B utilities, which are those having annual electric operating revenues in excess of $250,000.

PREVENTIVE MAINTENANCE OF ELECTRICAL EQUIPMENT, *214 pages, 6x9, by Lt. Com. Charles I. Hubert, McGraw-Hill Book Co. Inc., $4.*

Information on preventive maintenance and emergency repairs of electrical equipment, needed by operating engineers, maintenance electricians, plant superintendents, etc., is carried in this book. The material is divided into three sections to adapt it to technical, vocational and industrial programs. The sections deal with preventive maintenance for motors, etc.; trouble-shooting methods; and operating techniques.

A good idea in an expanding industry makes a company grow



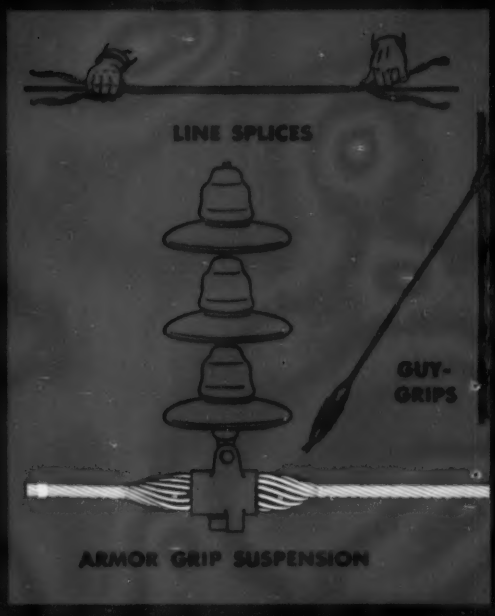
A Good Idea Grows with

A New Plant in Palo Alto, California

Situated in the well-planned Stanford University's Light Industrial tract, this modern plant now serves the Industry on the West Coast.

In Cleveland, There Are Now Two Plants

Preformed Line Products Company first opened its doors in Cleveland, Ohio. With a new addition—above—it now ranks as one of the fastest growing Companies in the area. The original plant on the left still serves as Home Office.



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the Industry It Serves...

The *Preformed* Armor Rod was the first product introduced by Preformed Line Products Company in 1947. It was invented by Thomas F. Peterson and developed by PLP for application as protective sheathing of conductors at support points. The Armor Rod, utilizing the "preformed idea", proved to be a worthy product. It is simple, inexpensive and easy-to-install, for use in both the transmission and distribution fields of application.

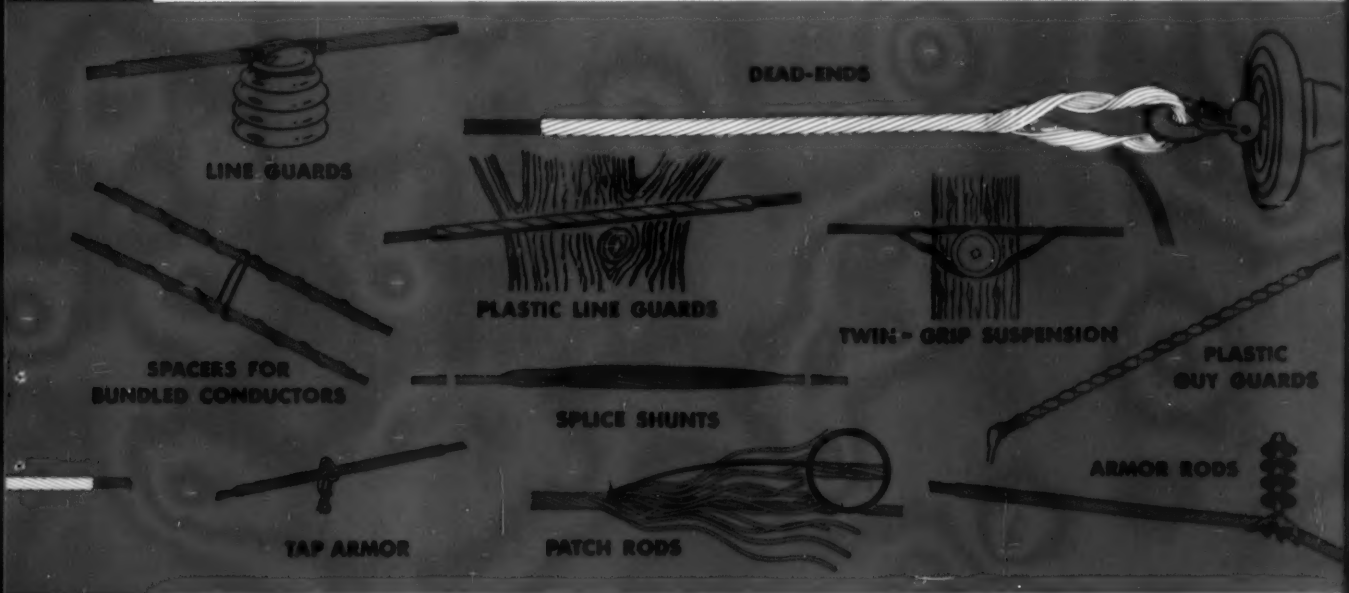
With acceptance came growth. Preformed Line Products Company steadily added to its staff, production capacity and facilities. From a modern up-to-date laboratory (where new and better products are constantly being sought) many new PLP Products sprang from the original "preformed idea". By keeping pace with the industry, the latest production techniques and quality controls were added.

Yet, one of the most important factors contributing to the Company's growth, has remained constant . . . *SERVICE TO THE INDUSTRY.*

Proof that GROWTH and SERVICE have always gone hand in hand at PLP is attested by the thousands of successful installations that have spread to all parts of the country.

Now, with the addition of a new plant in Palo Alto, California, and a second plant in Cleveland, Preformed Line Products Company has taken two more important steps to assure even greater service to the Industry it serves.

For further information on Preformed Products, write or call Preformed Line Products Company, Cleveland, Ohio: EXpress 1-3571.



Made in accordance with or for use under one or more of the following U. S. Patents: 2,275,019; 2,587,521; 2,609,653; 2,691,865; other patents pending.

PREFORMED LINE PRODUCTS CO.

5349 St. Clair Ave. • Cleveland 3, Ohio • Phone: EXpress 1-3571

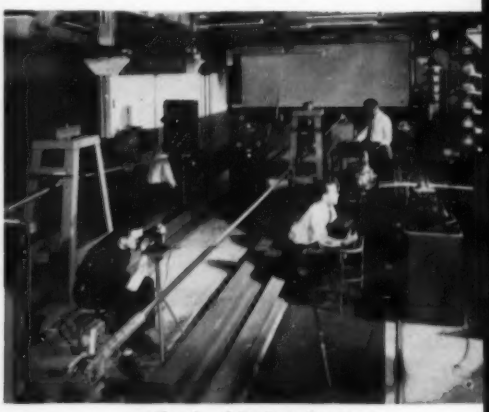
to grow... help others—grow

In educational fields, Preformed Line Products Company has assumed its full share of responsibility to the Industry. It has vigorously contributed to private endowments aiding college students interested in the field of Power and Power Transmission. As the Electrical Power Field grows, so too will the need increase for qualified engineers to serve the Industry.

Among the recipients of "Preformed" aid is Stanford University, a key research center for the Industry. Preformed Line Products Company also employs promising engineering students on a cooperative basis, thus enabling the students to supplement their regular education with practical experience.

With one of the finest equipped laboratories in the Industry, PLP has been able to introduce many new products during its comparatively short existence. Through a combination of research, investment, and a *recognition of human values,* this Company continues to forge ahead. If there is any single principle that guides the Preformed Line Products Company, it stems from a sincere belief that . . . "to grow—help others grow."

Stanford University



Cleveland PLP Laboratory

"Not what we give, but what we share,
For the gift without the giver is bare."
LOWELL'S "Vision of Sir Launfal"

PREFORMED LINE PRODUCTS CO.

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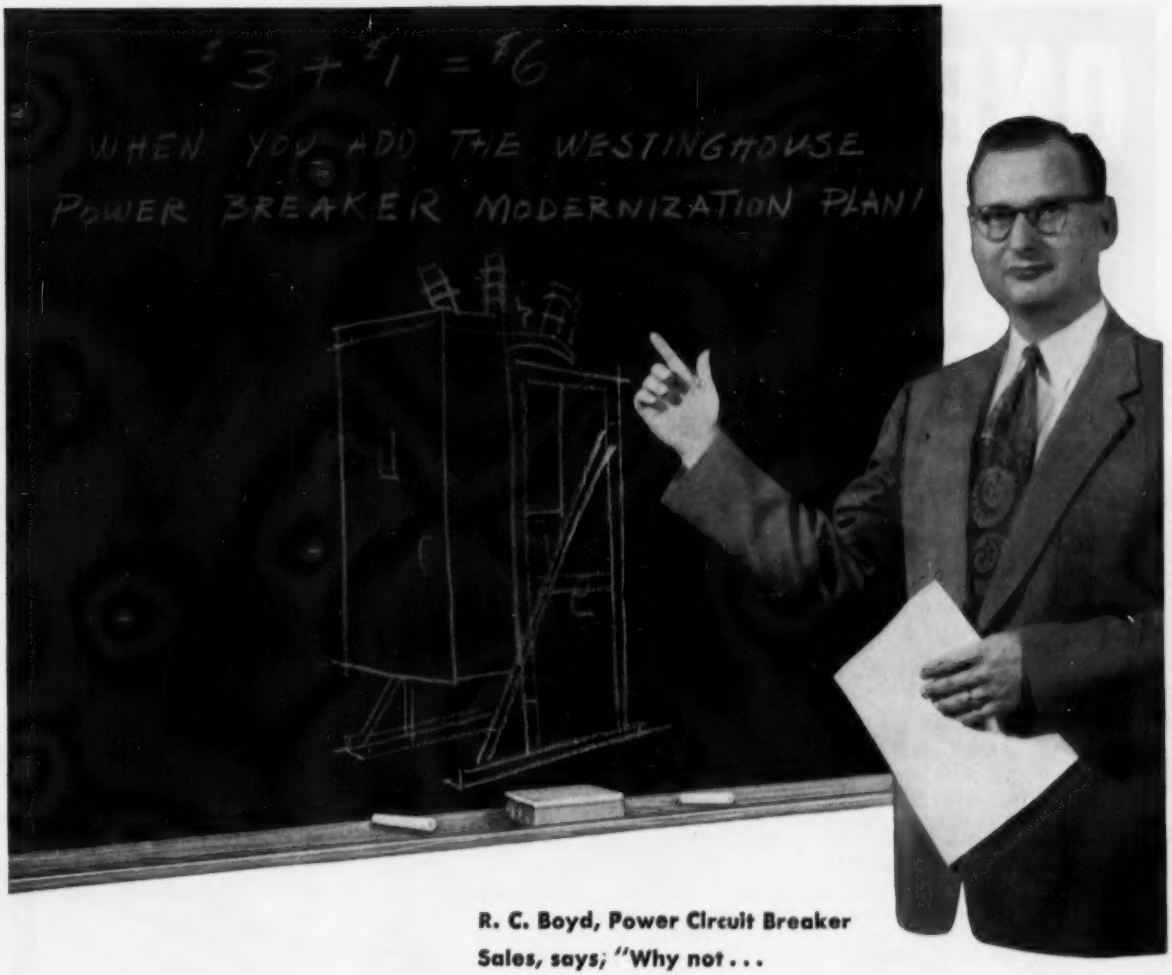
PLP



R. C. Boyd, Power Circuit Breaker Sales, says; "Why not . . .

uprate breakers at ⅓ new equipment cost"

Here's a way to double the value of breakers in place—at one third the cost of new equipment.

It's simple, and your Westinghouse sales engineer can give you the details quickly. When he knows the style and rating of your present breakers, he can suggest the proper interrupter replacement that will step up the capacity of your breakers 50 to 200%. You make the installation. No need to relocate or remount equipment. That's all there is to it.

In addition to keeping breaker capacity up and equipment investment down, you get additional benefits with new Westinghouse interrupters which will improve the quality and economy of breaker operation. The exclusive magnetic, multi-flow or tubular De-ion® grid interrupters extinguish arcs faster than ever before, which means less oil deterioration, less maintenance.

So, if you need one or more breakers that your budget won't allow, the Breaker Modernization Plan can probably solve your problem. Look into it. Call your Westinghouse sales engineer now, or write to Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-60879

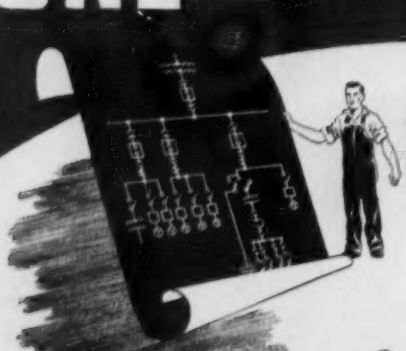
YOU CAN BE SURE... IF IT'S

Westinghouse

Plants at Berkeley, Calif.; Sunnyvale, Calif.; Emeryville, Calif.; Los Angeles; Portland; Salt Lake City; Seattle; Denver

ONE O.Z. FITTING DOES THE WORK OF 32

For Tee or Parallel Taps!



32 connector sizes needed on this job!

ONE connector size is plenty with this XTP!

One typical XTP connector replaces up to 32 different parallel or tee connectors because each XTP accommodates a wide range of wire sizes. All told, the XTP line of but 25 connectors will receive *over 400-wire size combinations!*

For either tee or parallel taps, just snap special hinged clamp over main and tighten the connector permanently in place—positive contact is assured. When you're ready to connect the tap, simply insert wire in tap end of connector. A wrench-turn or two, the job's done!

25 CONNECTOR SIZES do practically all tap jobs.
- Accommodate over 400 combinations of wire sizes
- Fit wire from #8 to 1,000,000 CM

HINGED CONSTRUCTION for quick installation.

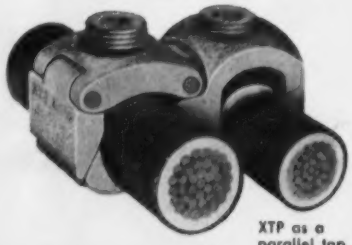
SPRING STEEL LOCK WASHERS (tin plated) maintain pressure.
- Hold resiliency—assure permanent connection

PRESSURE PLATES designed for maximum contact and grip.
- Serrated for firm grip
- Can not rotate during installation

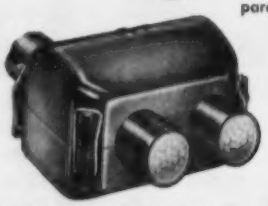
HIGH STRENGTH, HIGH CONDUCTIVITY.
- High conductivity copper alloy for body
- Extra strength copper alloy for pressure plates and hinged parts

Get these combination fittings from your wholesaler now... and put an end to bulky assortments of tap connectors.

XTP as a 'T' tap



XTP as a parallel tap



High-strength Bakelite insulating covers for XTP fittings. Compact, install with stainless spring clips, no taping.

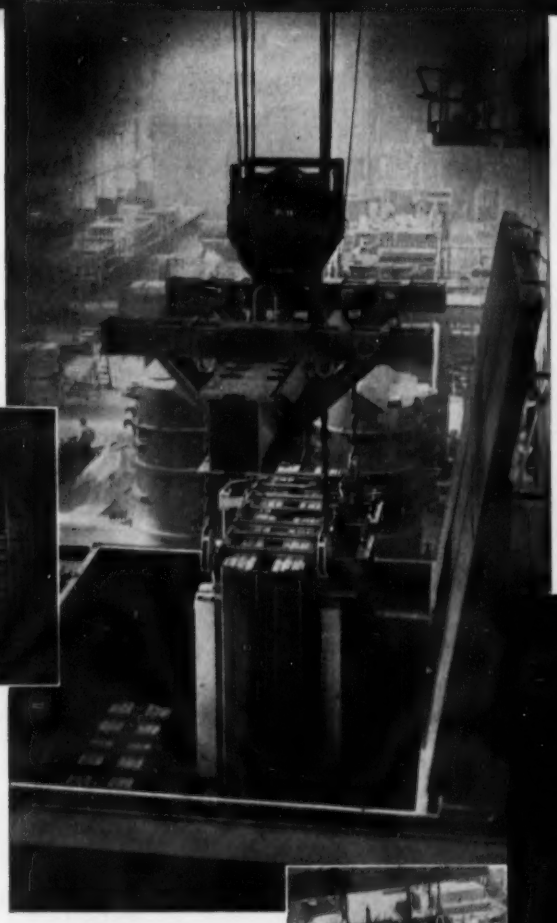
They're O.K. if They're O.Z.

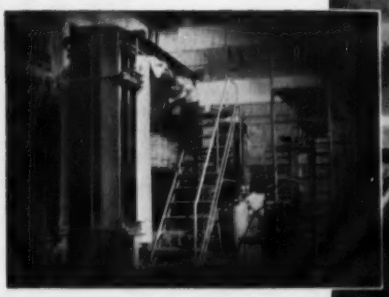
O.Z. ELECTRICAL MANUFACTURING CO., INC.

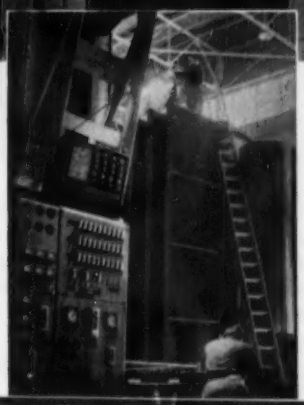
262 BOND STREET • BROOKLYN 17, N. Y.

San Francisco Plant: 749 Bryant Street, GArfield 1-7846

CAST IRON BOXES
CABLE TERMINATORS
POWER CONNECTORS
SOLDERLESS CONNECTORS
GROUNDING DEVICES
CONDUIT FITTINGS







MOLONEY ELECTRIC

DEPENDABILITY... STEP BY STEP...

FROM PLAN TO PERFORMANCE

From plan to performance . . . every step of the way . . . you can depend on Moloney for skillfully engineered and carefully fabricated power transformers—of any Kva and voltage rating—for your utility system.

Specify Moloney and you specify . . . Dependability at its best.

MEDS-54

MOLONEY ELECTRIC COMPANY

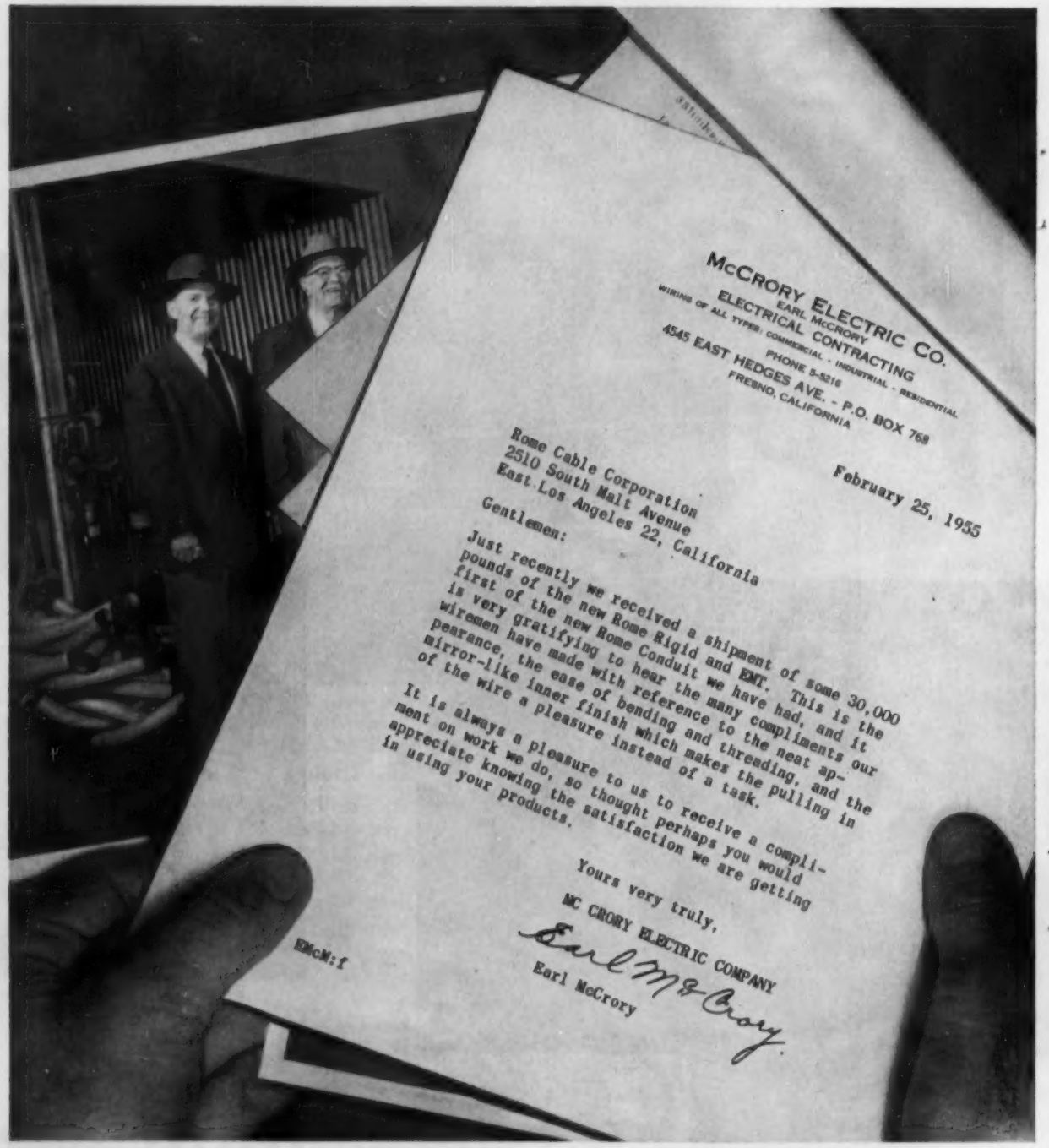
Power Transformers • Distribution Transformers • Step Voltage Regulators Regulating Transformers • Load Tap Changing Transformers • Load Center Transformers • Unit Substations • Network Transformers • Constant Current Transformers • Capacitors • Transformers For Electronics

MOLONEY ELECTRIC

SALES OFFICES IN ALL PRINCIPAL CITIES • FACTORIES AT ST. LOUIS 20, MO. AND TORONTO, ONT., CAN.

If you use electrical

Mr. Earl McCrory, prominent West Coast electrical contractor (right), and Mr. John Harvey, Mgr. Westinghouse Electric Supply Co., Fresno Branch, Fresno, Calif., both expressed real satisfaction with Rome-EMT and Rome-RIGID Conduit because of its uniform quality and ease of fishing.



McCRORY ELECTRIC CO.
EARL McCRORY
ELECTRICAL CONTRACTING
WIRING OF ALL TYPES: COMMERCIAL - INDUSTRIAL - RESIDENTIAL
PHONE 5-5216
4545 EAST HEDGES AVE. - P.O. BOX 768
FRESNO, CALIFORNIA

February 25, 1955

Rome Cable Corporation
2510 South Malt Avenue
East Los Angeles 22, California

Gentlemen:

Just recently we received a shipment of some 30,000 pounds of the new Rome Rigid and EMT. This is the first of the new Rome Conduit we have had, and it is very gratifying to hear the many compliments our wiremen have made with reference to the neat appearance, the ease of bending and threading, and the mirror-like inner finish which makes the pulling in of the wire a pleasure instead of a task.

It is always a pleasure to us to receive a compliment on work we do, so thought perhaps you would appreciate knowing the satisfaction we are getting in using your products.

Yours very truly,
MC CRORY ELECTRIC COMPANY
Earl McCrory

EMcM:f

Rome-EMT is stocked for you at these convenient warehouse points:

Atlanta, Ga.	Denver, Colo.	Rome, N. Y.	Seattle, Wash.
Chicago, Ill.	Kansas City, Mo.	Salt Lake City, Utah	St. Paul, Minn.
Dallas, Texas	Los Angeles, Calif.	San Francisco, Calif.	Torrance, Calif.

metallic tubing or rigid conduit

Here are 3 valuable facts you should know

1 You'll find that electrical contractors who use Rome•EMT and Rome•RIGID like it for very practical reasons. The generous and *unsolicited* letter from Mr. Earl McCrory (quoted at left), veteran West Coast electrical contractor, is an example of what Rome *users* think. It indicates what *you* can expect from Rome Cable.

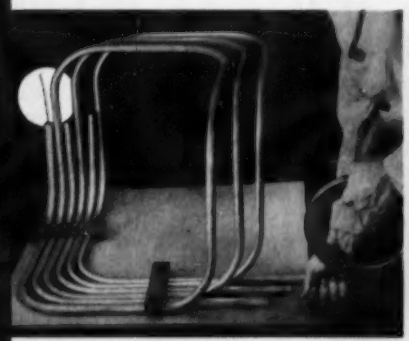
2 Your men will be able to install Rome•EMT faster because the slick new inside finish makes it easy to fish, faster to use than any other conduit on the market. The X-ray pictures on this page are proof of this statement—one more assurance that you'll profit from using Rome thinwall.

3 And, if quick delivery and availability of all standard sizes are important to you, you'll win again because Rome Cable is the *only* Pacific Coast factory source where complete stocks are available, ready for immediate shipment, of Rome•EMT (sizes ½" through 2") and Rome•RIGID (sizes ½" through 6").

Three plus values—user satisfaction, easy fishing for lower installation cost, immediate delivery in all sizes—are yours when you specify Rome•EMT and Rome•RIGID Conduit.

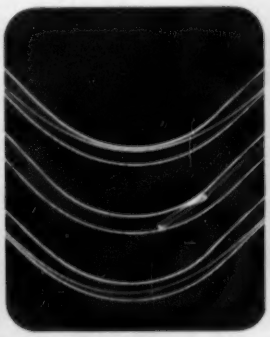
Write today for service or details. Helping you is our job.

This slick, shiny new interior in Rome•EMT lets fish tapes slide through with an absolute minimum of resistance.



Three test runs of conduit, Rome•EMT (closest to you) and two leading competitors were identically formed so that each ten-foot length of ½" EMT has eight 90° bends.

You can see that the ⅛" fish tape was pushed through all eight bends in the Rome•EMT. It took only seconds. But no amount of forcing would get the fish tape through either of the competitive brands.



This X-ray photo shows you how the standard ¼" fish tape hung fast on the fourth bend in competitor A's EMT.

In this X-ray photo you can see the ¼" fish tape stopped dead at the seventh bend in competitor B's EMT.

Note:
The X-ray photographs were taken by the Anstice Co., Inc., Rochester, N. Y., and witnessed by Chester Uffelman, Notary Public.

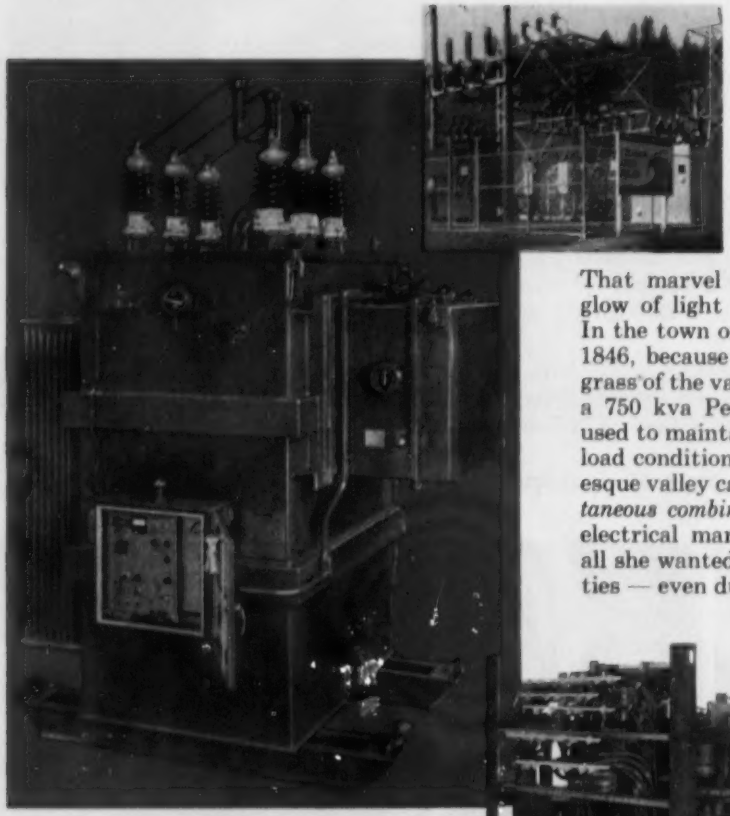
It Costs Less to Buy the Best

ROME CABLE Corporation
ROME • NEW YORK
and
TORRANCE • CALIFORNIA

If Alice passed through LOOKINGGLASS tonight . . .

her way would be lighted with uniform voltage regulated by this 750 Kva

Pennsylvania Step Voltage Regulator

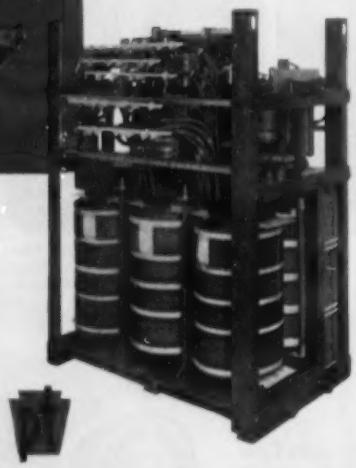


If Alice were to pass through Lookingglass tonight, she would see that many changes have been made since her famous nineteenth century trip to the land of topsy-turvy. One particularly marvelous sight would be found just about everywhere: in the streets, in homes, in stores, in barns.

That marvel would be the steady, never-flickering glow of light produced by *well regulated* electricity. In the town of Lookingglass, Oregon — so named, in 1846, because the reflection of the sun in the green grass of the valley created a mirror-like impression — a 750 kva Pennsylvania Step Voltage Regulator is used to maintain an even voltage throughout varying load conditions. As a result, residents of the picturesque valley can enjoy to the fullest extent *any simultaneous combination* of lights, appliances, and other electrical marvels. Alice could toy and experiment all she wanted to with present day electrical curiosities — even during the peak load hours of the day.

Similar Pennsylvania Step Voltage Regulators are performing identical jobs in many communities throughout the United States — helping to transform this country into an electrical Wonderland from coast to coast.

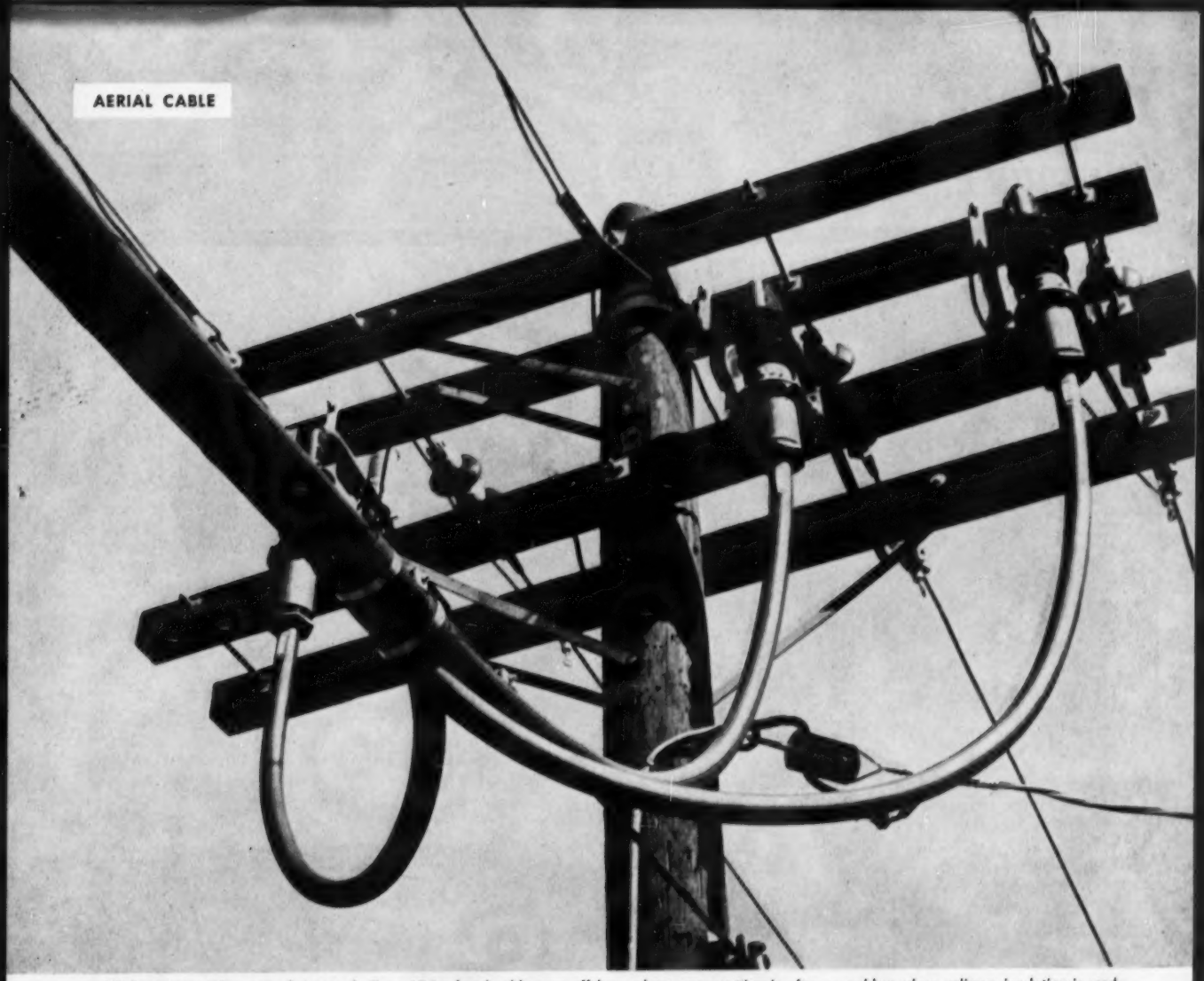
With this 750 kva Pennsylvania Step Voltage Regulator, the Bonneville Power Administration (U. S. Department of Interior) maintains an even flow of voltage for the Douglas Electric Cooperative, Inc., which serves the Lookingglass Valley and adjacent areas. The unit provides 34,500 volts at a rated current of 125.5 amperes. It is equipped with an automatic load tap changer for plus or minus 10% voltage regulation in thirty-two ¾% steps. (Three phase, 60 cycles, 55°C. rise, OA-outdoors.)



This internal view of the 750 kva Pennsylvania Step Voltage Regulator shows the exciting transformer, in the foreground, and one coil of the series transformer. Note the rigid supports of the LTC tap leads, and the rugged framework which permits the entire internal assembly to be handled as an integral unit.

PENNSYLVANIA TRANSFORMER COMPANY

A McGraw Electric Company Division • **CANONSBURG** • **PENNSYLVANIA** *Greater Pittsburgh District*



High-ozone resistance of Anaconda Type AB-insulated cable pays off here where ozone-cutting is often a problem when ordinary insulation is used.

New aerial cable gives ozone the air

New Anaconda Type AB-insulated cable has *highest* resistance to ozone.

Ozone-cutting – No. 1 enemy of high-voltage insulation – can be arrested.

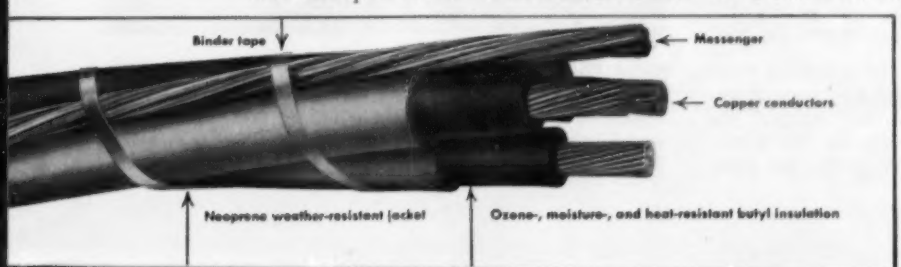
ANACONDA Type AB butyl insulation on aerial and other high-voltage cable ends this problem.

Type AB is *inherently* resistant to ozone. Moreover, this high resistance to ozone has enabled Anaconda engineers to concentrate on other properties – to develop Type AB's other electrical and physical properties to the very peak of performance.

Proof is in a series of tests – made over a period of years by Anaconda engineers. These tests – covering ozone, temperature, moisture absorption, dielectric strength, ionization level, aging, and other properties – show clearly the superiority of ANACONDA Type AB butyl insulation.

Put your cable problems up to the Man from Anaconda. Anaconda Wire & Cable Co., 25 Broadway, New York 4, N. Y.

FASTEST WESTERN SERVICE – Anaconda's Western Distributors and expanded and modernized Orange, California mill which fabricates copper and aluminum wire and cable for *every kind of application* assure West fastest possible service on all needs. See Anaconda Sales Offices: Los Angeles, San Francisco, Seattle.



ANACONDA®

AERIAL CABLE

PRODUCT NEWS

Grounding Measurement

(1) Borden Engineering Co., 39 E. Hanover Ave., Morris Plains, N. J.

A null reading Wheatstone Bridge for measuring the resistance to ground of driven rods, buried piping systems, grounding systems for power plants, transmission line towers, etc., is offered by this manufacturer. The W4 Groundmeter has full scale ranges of 1/5/10/50/100/500/1,000/5,000 and 10,000 ohms. It is self-powered by six flashlight batteries. Bulletin 171 carries full details.

Utility Line Truck

(2) Four Wheel Drive Auto Co., Clintonville, Wis.

A front-mounted digger and derrick, and a driving front axle rated at 9,500 lb, are two outstanding features of this new utility line truck. Called the U-150 "Rhino," the truck is designed for maximum visibility for the driver-operator as he works with a second man guiding the tools.

Split-Bus Load Center

(3) Trumbull Components Department, General Electric Co., Plainville, Conn.

A new circuit breaker load center with 20 circuits arranged in a split-bus interior design has been announced by this manufacturer. It is equipped with 100-amp main lugs. Available with fronts either for flush or surface mounting, the load center has a snap-action interior design for easy installation without tools. The arrangement allows five double-pole branches for 240-v service appliances, and a sixth double-pole branch feeds six single poles for lights and 120-v appliances.

Crane Control

(4) Westinghouse Electric Corp., 401 Liberty Ave., Pittsburgh, Pa.

This manufacturer has designed a standardized light industrial crane control to convert infrequently used cranes from cab to pendant operation. Advantages of the control are reported to be flexibility, low cost and ease of maintenance.

(5) A PROTOTYPE of Line Material Co.'s new vertical-break, group-operated disconnect switch is pictured here. The switch is designated type PV, and is rated at 115 kv, 600 amp. It is designed for sectionalizing, disconnecting or by-passing applications. The new switch will be in production early in 1956

He's coming to help you

He is a Bell System communications engineer. His purpose is to help you speed your operations, cut your costs and improve your service—by making sure your communications meet your exact requirements.

The Bell System offers a wide variety of private line services, including telephone, teletypewriter and mobile radio systems. And the Bell System tailors these facilities to meet specific individual needs, so that you maintain high-speed contact between your various departments, branches, factories, warehouses, as well as between you and your suppliers, customers, distributors and shippers.

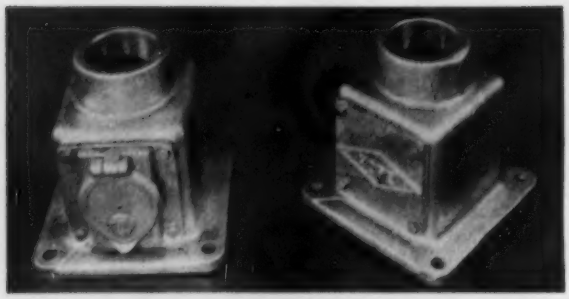
Why not let a Bell System communications engineer make a study of your communications requirements and recommend the kind of service, or a combination of services, which will best meet your specific needs?

• • •

His survey is free and his recommendations are yours without obligation. You can reach him by calling your nearest Bell Telephone business office.

BELL TELEPHONE SYSTEM

TELEPHONE TELETYPEWRITER MOBILE RADIO TELEMETERING AND REMOTE CONTROL CHANNELS



Pole Base Receptacle

(6) Hope Electrical Products Co., 333 Wilson Ave., Newark, N. J.

Lighting pole bases with three-wire, 20-amp, 250-v polarized weatherproof receptacles are new products of this company. The receptacles provide convenient plug-ins for the use of power tools on maintenance work. Picture shows the two receptacle covers available.

Cathodic Protection

(7) National Carbon Co., 30 E. 42nd St., New York 17, New York.

A new concept in impressed-current cathodic protection has been developed by this company. The system comprises a new graphite anode and an assembly technique to fix the anode on the cable exactly where it is needed. Crimp-type connectors are utilized. More information in bulletin S-6525, available from the manufacturer.

Breather and Drain

(8) Crouse-Hinds Co., Wolf & Seventh North St., Syracuse, N. Y.

A new stainless steel universal breather and drain of this manufacturer is reported to allow the passage of three to four times more volume of air than standard types. Device is for use on explosionproof combination starters and circuit breakers and other equipment housings in class I, C and D hazardous locations. It serves as a drain and as a ventilator.

Vacuum Tube Meter

(9) Leitch Engineering Corp., Manchester, N. H.

Range switching is completely automatic in this new volt-ohm meter, according to the manufacturer. Application of probes to points being checked gives an immediate reading on an 8½-in. meter and the scale to be read is indicated by a recessed red light. Measurement of a-c and d-c voltages is from .1 v to 1,500 v. In measuring resistance, automatic reading is possible from .5 ohm to one billion ohms in six ranges. Center scale value of the range in operation is indicated by recessed red light. The manufacturer states that the instrument is protected from burn-out or damage up to 2,000 v. On ohms the device is said to be protected against accidental application of voltages up to 300 v, a-c or d-c.

Power Network Computer

(10) Electronic Contractors Inc., 2207 E. Burnside St., Portland 15, Ore.

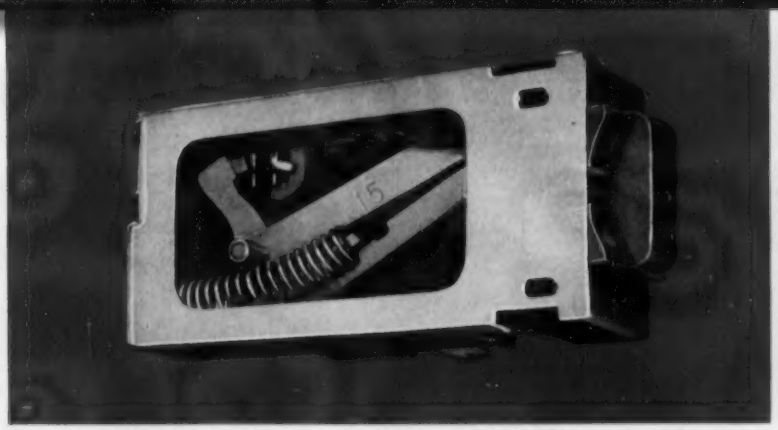
Quick solutions to complex power network system problems are possible with this new analogue computer, according to the manufacturer. It is stated that one man, using the computer, can solve a-c load flow and voltage regulation problems, d-c load flow problems, three-phase faults, single- and two-phase faults to ground, transformer tapping problems and other common power system computation. Standard model is rated as a 50-bus, 75-circuit board.

Vibratory Earth Borer

(11) Mall Tool Co., 7725 S. Chicago Ave., Chicago 19, Ill.

Fast boring of 2-in. holes by vibration, and without removing any soil, is the function of a new product of this company. The tool, including gasoline engine, is mounted on rubber-tired wheels for portability. It is reported that the borer head maintains a level course while traveling under sidewalks or driveways.

For Additional Information
Fill in the Coupon on Page 66



BEST WATCHDOG A CIRCUIT EVER HAD! Duo-Guard Pushmatics give trigger-quick automatic protection. Just a *push* restores service! They install in a jiffy. Won't shake loose because they bolt to bus bars. All Pushmatics are identical in size—are rated at 15, 20, 30, 40 and 50 amps. Cutaway window shows "Off" position.

BULLDOG PUSHMATIC ELECTRI-CENTERS GIVE

Double Protection! Double Convenience!

"CUSTOM" PANELS FOR ANY JOB . . . IN MINUTES

Here's the best way to serve every panel need from 2 to 42 circuits—safely, easily and *economically*. Insist on BullDog Electri-Centers® with famous Duo-Guard Pushmatic® breakers. And here's why:

First, you get double protection. Duo-Guard Pushmatics guard circuits (1) *thermally* against normal overloads, and (2) *solenoid magnetically* against high overloads and shorts. Branch circuits as well as delicate wiring in lamp cords are protected separately. Nuisance tripping from harmless overloads is eliminated.

Second, you enjoy double convenience. Using BullDog Electri-Centers (1) is like ordering custom-built panels, but receiving them without delay at standard panel prices, and (2) all Duo-Guard Pushmatics from 15 to 50 amperes fit any Electri-Center. See your Qualified Distributor or BullDog Field Engineer, or write: BullDog Electric Products Company, Detroit 32, Michigan.

© BEPCO

IF IT'S NEW
. . . IF IT'S DIFFERENT
. . . IF IT'S BETTER . . . IT'S

BULLDOG

ELECTRIC PRODUCTS COMPANY
A Division of I-T-E Circuit Breaker Company

Export Division: 13 East 40th Street, New York 16, New York. ***In Canada:*** BullDog Electric Products Company (Canada), Ltd., 80 Clayson Road, Toronto 15, Ontario.

CONSULT THE FOLLOWING PACIFIC COAST REPRESENTATIVES:

COAST ELECTRIC & MANUFACTURING CO.
1733 N.E. Seventh Avenue, P.O. Box 7712
Portland 12, Oregon

YOUNG ELECTRIC & MFG. CO.
2134 Curtis St.
Denver 2, Colorado

SAFETY SWITCHBOARD COMPANY
910—89th Avenue
Oakland 21, California

BULLDOG ELEC. PROD. CO. OF LOS ANGELES
2885 E. Washington Blvd.
Los Angeles 23, California

These Companies Switched to Valve Arresters

Company A, formerly a strong proponent of expulsion type arresters, recently decided not only to switch to valve type, but also now has crews replacing every expulsion arrester on the system.

Company B, a large user of protected transformers, decided to switch to valve type arresters; will no longer buy protected transformers unless they are equipped with valve arresters.

Company C was having trouble protecting equipment with expulsion arresters. At the recommendation of L-M engineers, the company has switched to valve type, has had no more trouble.

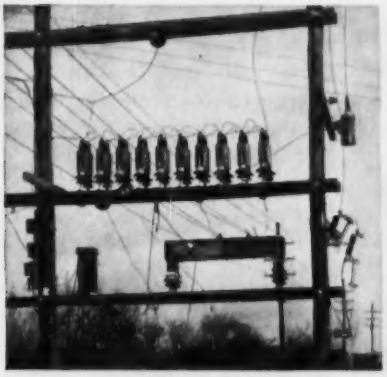
Valve Arresters Are Better

Valve type arresters give better protection, are not limited by system capacity, permit better fuse coordination, and last longer than expulsion arresters.

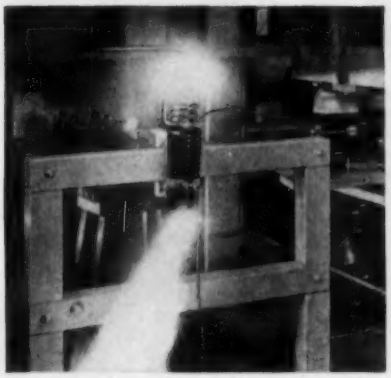
LM

LINE MATERIAL

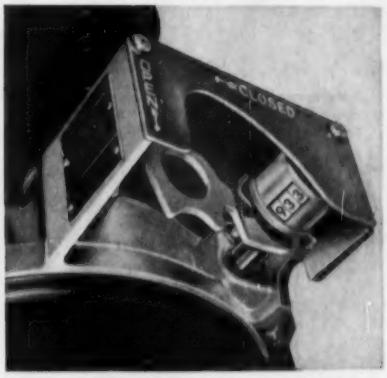
These Companies Prefer Valve Arresters



Company D conducted extensive tests of lightning arresters in its own special field laboratory, to prove that expulsion arresters were satisfactory. But the evidence was the other way; the company continues to use valve arresters exclusively.



Company E was having a large number of outages caused by blown fuses. L-M engineers worked with the utility engineers to locate the cause—traced the fuse blowings to expulsion arresters.



Company F was experiencing an increasing and excessive number of recloser operations. The cause was high follow current passed by expulsion arresters, according to a 2-year study. They are now considering standardizing on valve arresters.

Than Expulsion Arresters

Here's Why...

by **GEORGE W. COOPER**
Product Manager
Protective and Power
Switching Equipment
Line Material Company

As a major manufacturer of both valve and expulsion type distribution lightning arresters, L-M is frequently asked—"Which arrester principle is best for my system?"

The question is not a new one. It originated with the advent of the expulsion arrester. At that time, about 25 years ago, utilities were finding moisture, a result of improper sealing, the cause of many valve arrester failures. For this reason interest developed in the expulsion arrester principle. However, in more recent years, positive sealing of the valve arrester has been achieved.

This and other important improvements have been thoroughly tested and proved by operating companies. Field experience has provided the answer: *valve arresters are better than expulsion arresters.*

Regardless of differences in design by various manufacturers, there are certain basic differences in the valve *principle*, as compared with the expulsion principle.

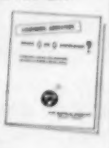
The valve arrester operates on the principle of a valve, which "opens," with low resistance to high voltage, high current lightning surges, and "closes," with high resistance to 60-cycle follow current.

The expulsion arrester operates on the pressure principle, of expelling the power follow current arc. For this purpose a fibre tube must be used to form the gases which expel the arc—and this fibre is subject to erosion—and changing characteristics. These limitations apply regardless of differences in design, manufacture, etc.

Listed at the right are four principal reasons why we recommend valve type arresters over expulsion arresters.

Get Complete Information

Details of some of the extensive evidence in favor of valve over expulsion arresters are given in a new booklet ("Valve versus Expulsion Arresters"). Whichever type you use, we believe you'll be interested in this report. Ask your L-M Field Engineer for a copy, or write Line Material Company, Milwaukee 1, Wisconsin (a McGraw Electric Company Div.)



FOUR PRINCIPAL REASONS for recommending valve over expulsion type arresters

1 **Better Protective Characteristics**—The valve arrester sparks over more quickly and at lower voltages on lightning surges. Transformer end turns are not stressed by a complete voltage collapse following sparkover. Although the expulsion arrester provides a satisfactory level of protection for most transformers, a higher degree of protection is available through the proper application of valve arresters.

2 **Unlimited 60-Cycle Capacity**—The application of the valve arrester is not limited by the available short-circuit current. The expulsion arrester, operating on a pressure principle, has a definite top limit and may have a bottom short-circuit current rating. (Too much current causes it to explode; too little fails to expel the arc.)

3 **No Fuse Coordination Problems**—The valve arrester will pass relatively small values of 60-cycle follow current, regardless of system capacity. Expulsion arresters can pass high follow current, which may cause unnecessary operations of sectionalizing devices.

4 **Longer Life**—The valve arrester is electrically and mechanically unaffected in handling lightning discharges usually encountered in service. Its life is relatively unlimited. The expulsion arrester ages and changes its characteristics, because atmospheric conditions and erosion due to operation affect the fibre.

Lightning Arresters

Chicago contractor whips

PROBLEM:

Wiring in corrosive atmosphere

ANSWER:

KNOB and TUBE wiring

Gets greater load capacity

A Chicago electrical contractor, installing the electrical system for a new hide-curing plant, was faced with a problem of high humidity and corrosive atmosphere. His solution—Knob and Tube wiring backed by the approval of a very safety conscious city inspection department. Knob and tube wiring is safer—easier to install and at lower cost—reduces maintenance—and will last indefinitely. Safely carries greater loads than any other method of wiring—from 33% to 100% more.

You can get all these qualities—and more—with Knob and Tube wiring. When you want the finest—for tough electrical wiring installations—specify Porcelain Products Knobs and Tubes. They're backed by over 60 years experience in the manufacture of electrical porcelain insulators. Contact your nearest jobber or write us direct.

MANUFACTURERS OF ELECTRICAL PORCELAIN SINCE 1894

61 years **PP —INC—**

Porcelain Products, Inc.

FINDLAY, OHIO

Shovel-Crane

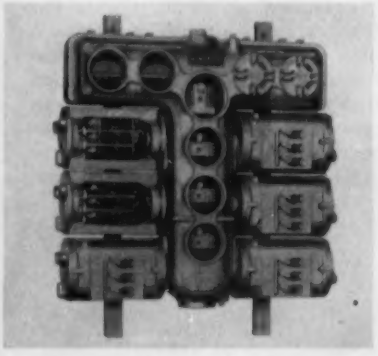
(12) Schield Bantam Co., Waverly, Iowa

A new self-propelled, ⅜-cu-yd, six-ton shovel-crane made by this company is reported to have the shortest self-propelled turning radius in the industry. Attachments for the unit include crane, clamshell, dragline, shovel, trench hoe, magnet, grapple, pile driver and backfiller.

Neoprene Portable Cords

(13) Western Insulated Wire Co., 2425 E. 30th St., Los Angeles, Calif.

A content of not less than 67.32% neoprene in the jacket is claimed for a new line of portable electric cords made by this company. The additional neoprene content is said to provide better protection against various factors that affect electrical cords in an industrial environment.



Explosion-Proof Panelboard

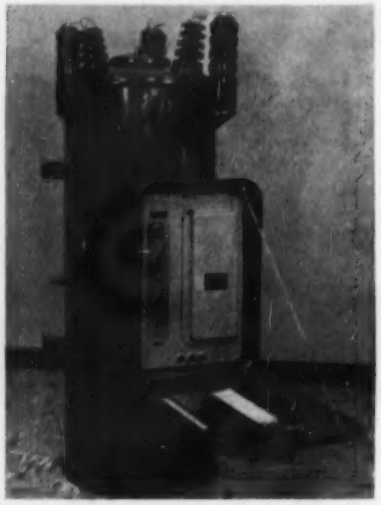
(14) Pyle-National Co., 1334 N. Kostner Ave., Chicago 51, Ill.

An explosion-proof metal-to-metal seal is provided by a triple sectioned continuous grooved joint that meshes cover, end plate and body of this new panelboard. Available in 2-, 4-, 6- and 8-gang types.

Electrical Protector

(15) I-T-E Circuit Breaker Co., 19th & Hamilton St., Philadelphia 30, Pa.

Short-circuit current protection up to 100,000-rms amp is provided in a new low-voltage circuit breaker design of this manufacturer. The design is said to wed a current limiting device to a standard molded case circuit breaker in a housing only a few inches longer than standard.



Step Regulators

(16) Westinghouse Electric Corp., Box 2099, Pittsburgh 30, Pa.

Improved electrical characteristics, improved sealing and fewer parts are stated new features of a recently redesigned line of pole-type step regulators made by this company. Available in standard ratings up to 200 amp at 2,500 v, 150 amp at 5,000 and 7,620 v, 100 amp at 13.8 kv and 50 amp at 14.4/24.9 kv. About 40 external clamps, lugs and bolts are eliminated by a single bolt through the center to secure the cover. Plug and receptacle units replace the junction box.

Staple Gun

(17) Arrow Fastener Co., 1 Julius St., Brooklyn 12, N. Y.

One-hand operation is reported to be an outstanding feature of this new stapler for fastening low-voltage wire. The device stops staples at the right height, according to the manufacturer, and so prevents wire damage and short circuits. A tapered edge on the stapler allows its use in corners. The device is known as the T25 Staple Gun.

Important NEW triplex from Kaiser Aluminum!

TRIPLE A TRIPLEX with special strength All-aluminum Neutral

Develops full neutral strength with wedge, preformed, automatic, loop and other dead ends.

Lighter weight for easier handling.

All-aluminum construction assures greater resistance to corrosion—even in "problem" areas.

HERE'S ONE of the most important conductor developments in years—the new Kaiser Aluminum Triple A Triplex!

A special aluminum alloy—developed by Kaiser Aluminum—provides *maximum physical strength* consistent with essential electrical properties.

Triple A Triplex is ideal for applications where strength superior to EC grade aluminum is desired and where conditions demand high performance or maximum resistance to the elements.

New Kaiser Aluminum Triple A Triplex is *now available* in several constructions at only a slight premium in price, which is *more* than offset by the advantages of this new construction.

We will be glad to send you a sample for installation and testing. Contact the Kaiser Aluminum sales office listed in your telephone directory or one of our many distributors. Kaiser Aluminum & Chemical Sales, Inc. *General Sales Office*, Palmolive Bldg., Chicago 11, Illinois; *Executive Office*, Kaiser Bldg., Oakland 12, California.

Kaiser Aluminum

setting the pace—in growth, quality and service

Polyethylene & Neoprene Weatherproof and Triplex
Quadruplex • ACSR, All-Aluminum conductor
Rectangular, Solid Round and Tubular Bus

Distribution Transformers

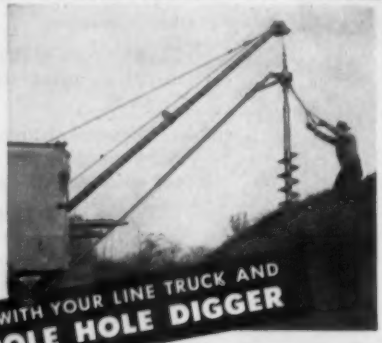
Oil Filled
Askarel Filled
Dry Types

Quality Materials
and Quality Workmanship
Result In —
"TRANSFORMERS
THAT STAY IN SERVICE"

HILL TRANSFORMER CO., INC.
1030 WASHINGTON ST., SAN CARLOS, CALIFORNIA

Represented By
THE BAXTER COMPANY
101 KANSAS ST., SAN FRANCISCO, CALIFORNIA

- Reaches hard to get at spots
- Bores holes up to 10 feet deep from any truck position
- Low cost—easy to use—easy to transport
- Industry tested and accepted



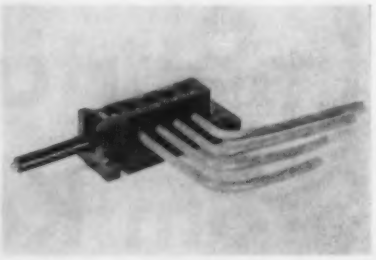
DIG HOLES—SET POLES WITH YOUR LINE TRUCK AND
TEL-E-LECT'S POLE HOLE DIGGER

When your derrick truck is equipped with a Tel-E-Lect Digger, your crew can dig a hole and set a pole in less than five minutes! This rugged auger, suspended from a front or rear mounted derrick, is raised or lowered by the winch line. Auger rotation power is supplied through a telescoping drive shaft connected to the PTO.

This efficient digger reaches up on a hill, down into ditches, or across obstacles . . . anywhere up to 20 feet behind the truck. The interchangeable hardened steel augers, 8" to 20" in diameter, are built to operate under the most rugged soil conditions.

Distributed by: Am. Equipment & Body Co., Los Angeles 33; Robbie's Utility Equip. Co., Seattle; Sagvaro Body & Equip. Co., Phoenix, Arizona; Utility Body Co., Oakland 7; Williamson Body & Equip. Co., Ogden, Utah.

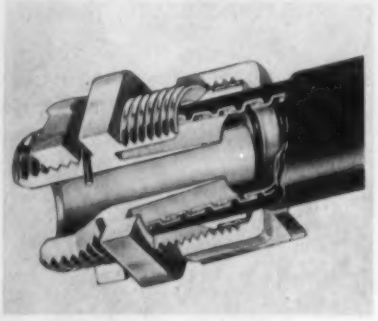
Tel·E·Lect PRODUCTS, INC.
10,025 Minnetonka Boulevard Minneapolis 16, Minnesota



Distribution Blocks

(18) Thayer Industrial Products Co., 18 W. Greenbrook Rd., North Caldwell, N. J.

These new distribution blocks are available with 2, 4, 6, 8 or 10 taps and are rated for 600 v for 70-, 125- or 225-amp service. UL-listed pressure connectors allow multiple connections in a wide range of wire sizes, to be made in one tap, according to the manufacturer. Prices and specifications on Data Sheet 4-D-4.



Conduit Connectors

(19) Thomas & Betts Co., 36 Butler St., Elizabeth, N. J.

To terminate large sizes of liquidtight flexible conduit, this manufacturer has extended its liquidtight connector line to sizes 2½, 3 and 4 in. Fittings will reportedly accommodate any flexible conduit spiral. Made in straight, 90° and 45° elbow designs.

Ice-Melting Pellets

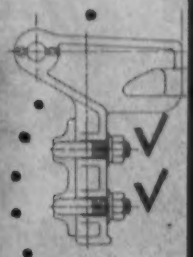
(20) Speco Inc., 7308 Associate Ave., Cleveland 9, Ohio

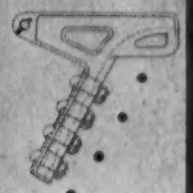
Ice Rem is the name of a snow- and ice-melting compound of this manufacturer. Effectiveness of the compound is reported recently to have been increased with the addition of a chemical ingredient that also retards rust action and increases storage life. The product is available in 10-lb cans, 25-lb pails and 100-, 200-, 300- and 500-lb drums. Ton lots are shipped in 100-lb waterproof bags.

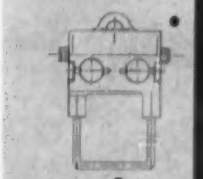
THE ORIGINAL

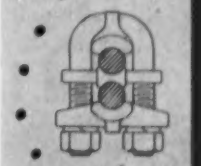
SERVICE PROVEN DESIGNS FOR YOUR STRAIGHT STRAIN CLAMP APPLICATIONS

advanced design









This series of clamps, developed through use over a five year period, was the original aluminum alloy straight strain clamp series offered to the power industry. Through actual field use of several hundred thousand of these clamps the particular designs listed below evolved. Through service experience, alternate but similiar designs have been developed for several different cable sizes in order to coordinate clamp performance with varied types of construction. All clamps listed have had service use in volume and their performance is readily predictable.

Specifications: Body and Keeper . . . High strength, heat treated, aluminum alloy. Hardware . . . hot dipped galvanized steel. Cotter pin . . . Humpbacked silicon bronze.

Catalog Number	Cable Size		Dimensions			No. of U-Bolts	Ult. St. in pounds	Weight of Each
	ACSR–	All-Alum.	A	B	C			
ASD–2	4–1/0	3–2/0	9″	3″	2¾″	2	8,000	1.0 lbs.
ASD–34	1/0–4/0	1/0–250	9¾″	3½″	3⅜″	2	8,000	2.25 lbs.
ASD–4	1/0–4/0	2/0–250	11¾″	3½″	3⅜″	3	14,000	3.25 lbs.
ASD–45	3/0–397.5	4/0–500	9¾″	3½″	3¾″	2	8,000	2.25 lbs.
ASD–45L	3/0–397.5	4/0–500	11¾″	3½″	3¾″	2	8,000	2.50 lbs.
ASD–5	266.8–336.4	300–397.5	11¾″	4⅛″	3⅞″	2	18,000	3.75 lbs.
ASD–6	266.8–477	300–556.5	11¾″	4⅛″	3⅞″	2	18,000	3.75 lbs.
ASD–7	266.8–795	266.8–954	13⅝″	4⅝″	3⅞″	2	18,000	5.0 lbs.

TYPICAL TEST DATA

by Pittsburg Testing Laboratory

Catalog No.	Cable Size	Maximum Load	Remarks
ASD–2	No. 2 – 6/1 ACSR	2,400 lbs.	Core Slipped
ASD–2	No. 2 – 6/1 ACSR*	2,925 lbs.	Core Broke
ASD–2	No. 1/0–6/1 ACSR	2,840 lbs.	Core Slipped
ASD–34	No. 4/0–6/1 ACSR	5,600 lbs.	Core Slipped
ASD–4	No. 4/0–6/1 ACSR	5,900 lbs.	Core Slipped
ASD–45	397.5–18/1 ACSR	6,850 lbs.	Core Slipped
ASD–5	336.4–26/7 ACSR	7,900 lbs.	Core Slipped
ASD–7	795 – 26/7 ACSR	13,000 lbs.	Test Rig Limit

*Aluminized core wire .104.8% of rated cable strength developed.

Bethea COMPANY, INCORPORATED
P.O.BOX 1407 BIRMINGHAM 1, ALABAMA

West Coast Representative:

F. E. POPE • P. O. BOX 249 • BURLINGAME, CALIFORNIA

ALUMINUM CABLE FITTINGS

If you want to know why fine FANNER ARMOR RODS are "superformed", look closely at the details of construction . . . because it is the details which make a difference to the line and the lineman . . . it is the details which denote a quality product.

For example, look at the clean, smooth rounded ends that eliminate the danger of nicking conductors or scratching linemen's hands . . . that minimize corona . . . and result in tight, tailored, form-fitting line reinforcements. Notice how every rod is exactly like every other rod of the same size regardless of the "lot", so that all can be matched in perfect sets. Fanner's manufacturing methods provide unvarying consistency of product dimensions to insure that all lots are identical and uniform.

For armor rods that always start right and end well — use FANNER Superformed ARMOR RODS — they cost you no more than other types! Write today for descriptive literature.

PACKAGED for PERFECTION, too!

FANNER Superformed Armor Rods are protected from end to end in sturdy full length cartons with contents fully identified. Rods stay clean, new and undistorted — *right up to the very minute they are used!* At slight extra cost they are also banded in sets of the proper number with extra - strength identifying tape that prevents breakage in shipping or handling — another feature that saves time, money and eliminates waste. It pays to use "FANNER"!

Licensed for use under Patent No. 2,275,019

Fine Fanner Superformed

THE FANNER MANUFACTURING CO.
Brookside Park • Established 1894 • Cleveland 9, Ohio

AGENTS IN PRINCIPAL CITIES

ARMOR RODS • TAP ARMOR • LINEGUARDS • PATCH RODS

(21) NEW CONTAINERS for Pennsylvania Transformer Co.'s "Pole Star" distribution transformers are fireproof, cover-gasketed metal drums. They are said to provide maximum protection for the transformers both in transit and during indoor or outdoor storage and helps with handling of the units. In addition, the container can be used for other purposes in and around plants, warehouses, substations, etc. Company's address is Box 330, Canonsburg, Pa.

Separate 480-v Ratings

(22) General Electric Co., Trumbull Components Dept., Plainville, Conn.

Separate 480-v a-c interrupting ratings for this company's molded case circuit breakers are available. For F, J, K, and L frame sizes, the new interrupting ratings are 15,000 amp, 20,000 amp, 25,000 amp and 35,000 amp, respectively. Until now the only 480-v a-c interrupting ratings for these circuit breakers have been the same as at 600 v.

Mobile Radiophone

(23) Motorola Communications & Electronics Inc., 4501 W. Augusta Blvd., Chicago 51, Ill.

A complete new line of mobile two-way radio units called Twin V has been developed by this manufacturer. Operating from either 6- or 12-v batteries, the line is said to have improved receiver sensitivity, noise suppression and voice frequency reproduction. New tube types and new circuits are also reported to give better fringe-area reception.

(24) WATER PUMP SWITCH—Square D Co., 4335 Valley Blvd., Los Angeles 32, Calif., has announced a newly designed, low-cost water pump switch for shallow well water systems involving pressures up to 60 psi. Range and differential settings are adjustable.

The "Blue Ribbon", resistor with a higher wattage rating per unit space requirement. Made by Hardwick, Hindle, Inc., Newark, N. J.

because of DRIVER-HARRIS 146 ALLOY

Here is a resistor really new and different . . . the compact Hardwick, Hindle "Blue Ribbon," which stands remarkably high overloads and excessive heat without crazing.

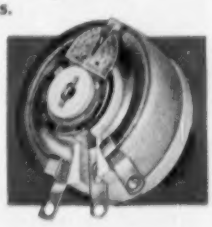
Special design features which make this possible are: an aluminum thru-bar extending through the center of the elliptical ceramic core, which insures a more even distribution of heat to prevent "hot-spots;" and a thermo-shock-proof enamel coating which eliminates crazing.

Heretofore, crazing, which occurred mostly at *terminal* areas, shortened resistor life and limited the safety factor. To prevent this, an alloy with three hard-to-find qualities was needed: (1) It had to have a coefficient of expansion to match all integral parts; (2) it had to be free of gas; (3) it had to form a perfect bond with the enamel.

A large order, indeed. But Driver-Harris filled it by developing #146, a glass-to-metal sealing Alloy. This alloy now makes it possible to operate resistors and rheostats at hitherto dangerous overloads, with no risk of breakdowns in the enamel coatings.

146 Alloy is one of 4 Driver-Harris Alloys which cover most glass-to-metal sealing needs—available as rod, wire, strip, sheet foil, and in special shapes. Today the makers of the "Blue Ribbon" use 146 Alloy for the terminals in all of their resistors and rheostats as well. They also use Nichrome*, Advance*, and other gas-free resistance alloys made by Driver-Harris in winding the cores.

What you can learn from this is clear. If you also need a special purpose alloy, send us your specifications. Our engineers with 48 years of experience are at your service.



One of a new line of "H" Series high wattage rheostats made by Hardwick, Hindle, using Driver-Harris Alloys.

*T. M. Reg. U. S. Pat. Off.

Nichrome and Nichrome V are made only by

Driver-Harris Company

Western Representative: **ANGUS-CAMPBELL, INC.**

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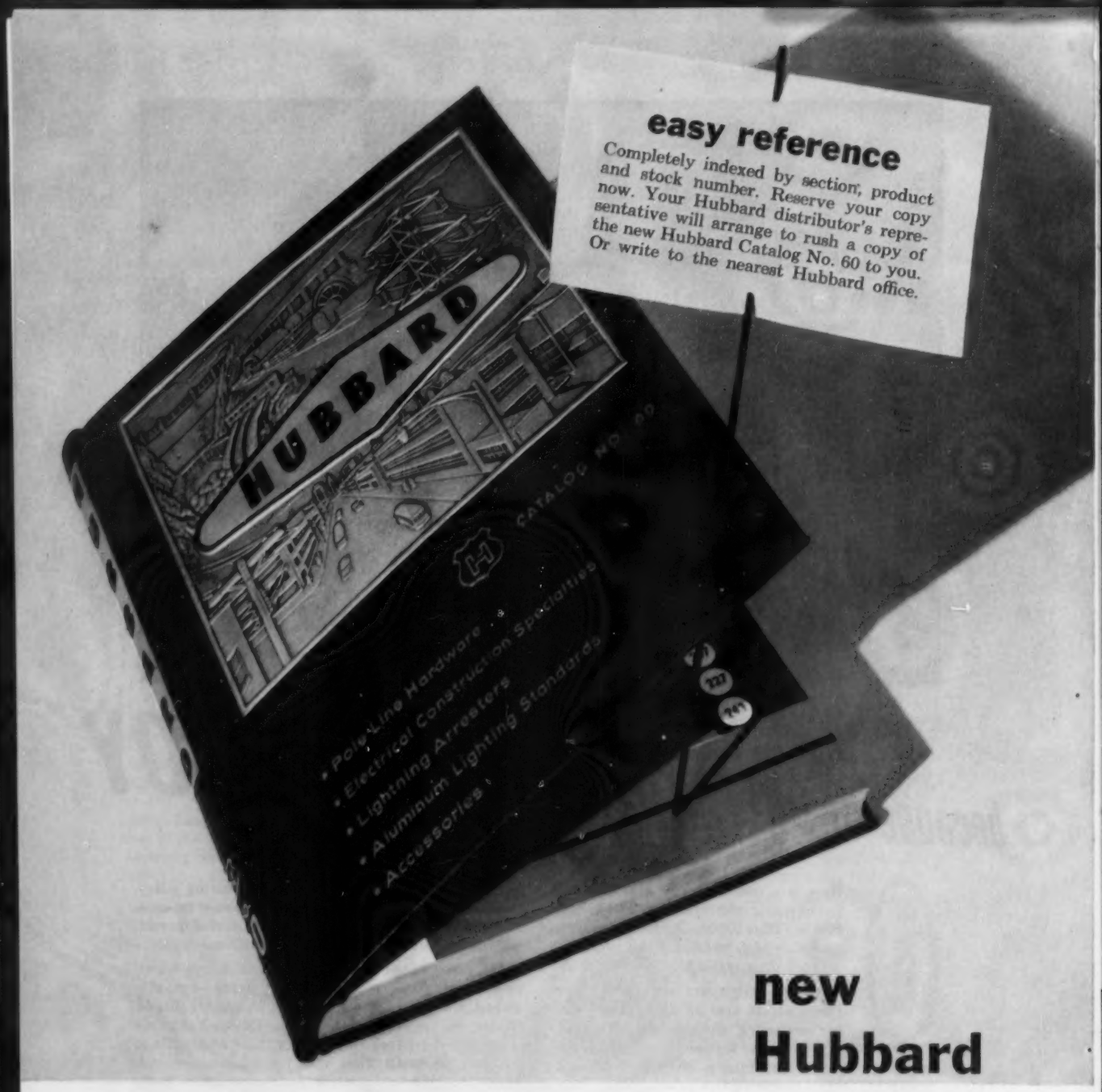
MAKERS OF THE MOST COMPLETE LINE OF ELECTRIC HEATING, RESISTANCE, AND ELECTRONIC ALLOYS IN THE WORLD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HUBBARD
CATALOG NO. 60
• Pole Line Hardware
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• Aluminum Lighting Standards
• Accessories

new Hubbard general catalog No. 60

This comprehensive, 260-page catalog is just off the press. An invaluable source of technical and product data, it presents in compact and usable form, detailed listings of Hubbard Products for the Utility Industry.

Technical Data — Arranged in convenient, tabular form. Gives you complete information on weights, measures and material properties plus indications of major industry standards.

Product Information — Brief, detailed description of products, applications, dimensions and shipping weights. Cross-referenced with price lists.

HUBBARD AND COMPANY

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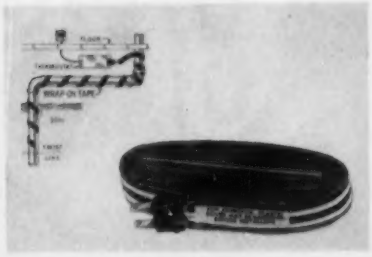
Oakland 8, Cal.



Electric Heating Tape

(25) Wrap-On Co., 340 W. Huron St., Chicago, Ill.

A new self-adhesive electric heating tape that is quickly installed to keep water pipes from freezing is being introduced by this company. It is available in 3-, 6- and 13-ft lengths, with 15, 30 and 60 w respectively at 115 v a-c. The plug may be used on any household electric outlet or extension cord socket. All-weather thermostats available.

Receiver Recorder

(26) Bailey Meter Co., 1050 Ivanhoe Rd., Cleveland 10, Ohio

A characteristic cam in the receiver of this receiver recorder extracts nonlinearity making it possible to combine four records from d-c pickups, a-c pickups or pneumatic transmitters on the same graduated chart. Designed for use in telemetering systems for power plants, process plants and laboratories. The recorder may house as many as four plug-in d-c receivers or two receivers and two pneumatic controllers.

L-Frame Circuit Breakers

(27) General Electric Co., Trumbull Components Dept., Plainville, Conn.

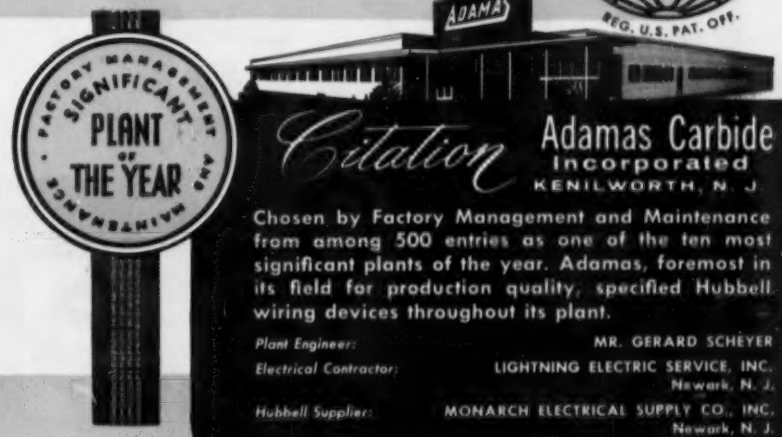
A new interrupting rating of 50,000 amp at 240 v a-c for this company's L-frame molded case circuit breaker is announced. It is an increase of 25%. It is said to allow more application flexibility in 240 v a-c circuits. It applies to all ampere ratings of L-frame breakers.

(28) **LOADER** — This hydraulic tailgate loader fits all 1½-ton and larger trucks without altering the truck structure, according to the manufacturer, Converto-Wood Mfg. Co., Cambridge City, Ind. Available in 2,000- and 4,000-lb sizes.

Use Coupon, Page 66, to secure manufacturer's literature on these products

. . . HUBBELL CONTRIBUTES PRODUCT QUALITY AND PERFORMANCE

HUBBELL
REG. U.S. PAT. OFF.



Citation

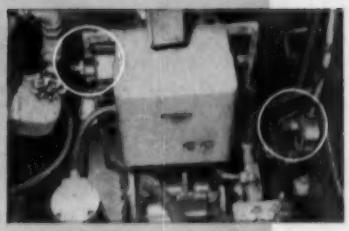
Adamas Carbide
Incorporated
KENILWORTH, N. J.

Chosen by Factory Management and Maintenance from among 500 entries as one of the ten most significant plants of the year. Adamas, foremost in its field for production quality, specified Hubbell wiring devices throughout its plant.

Plant Engineer: MR. GERARD SCHEYER
Electrical Contractor: LIGHTNING ELECTRIC SERVICE, INC. Newark, N. J.
Hubbell Supplier: MONARCH ELECTRICAL SUPPLY CO., INC. Newark, N. J.

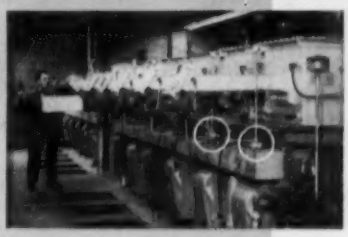
No. 5282

Circled right, Hubbell 5282 3-wire duplex outlet used on auxiliary machine equipment along with 3-wire grounding type rubber cap, No. 5276. Also note use of Twist Lock No. 7417 and 7411 on machine at left



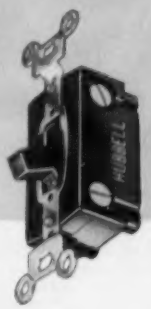
No. 7517

At right, main furnace room at the Adamas plant showing rugged Hubbell Twist Lock units (7517 receptacle and 7311 cap) used in connection with the furnace controls.



No. 7411

Twist Lock units like the 4-wire No. 7411 cap provide a secure, vibration proof and pull proof connection used on test equipment in the Adamas laboratory. Illustration shows 7411 and 7410 receptacle in use.



No. 1201

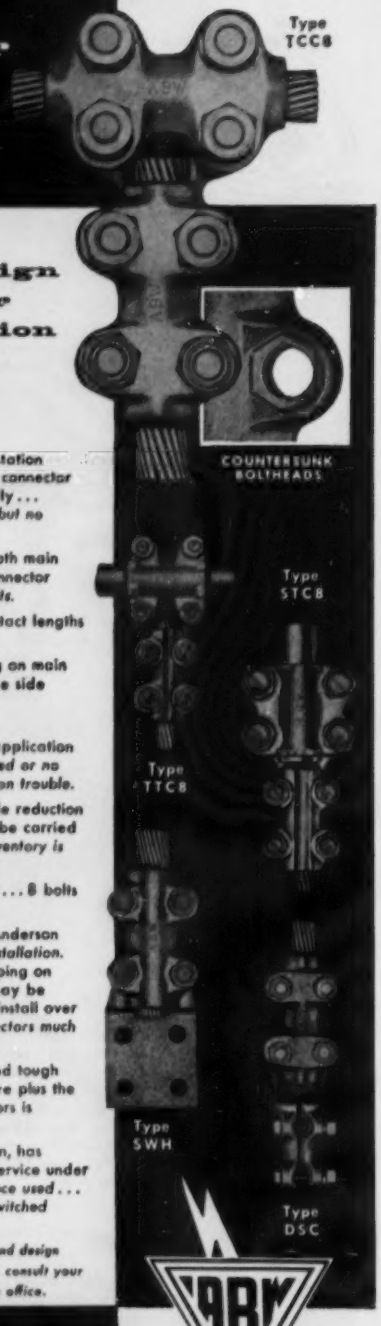
Quiet, dependable Topper AC switches control the modern fluorescent lighting used throughout the Adamas plant.

SOLD ONLY THROUGH AUTHORIZED ELECTRICAL DISTRIBUTORS

HARVEY HUBBELL, INC.

DEPT. W, BRIDGEPORT, CONN.

Five Examples of more connector for your money!



Vers-a-groove design gives you a wider range of application ...reduces the possibility of misapplication!

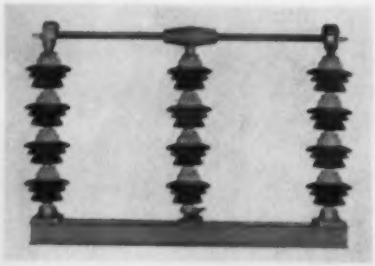
The 9 standout features of these Anderson Substation Connectors cannot be duplicated by any other connector line available. Look over these features carefully... several manufacturers may claim some of them, but no connector line has them all!

1. Two complete pairs of clamping bolts on both main and tap provide extra insurance against connector failure. Most other designs have only six bolts.
2. Higher clamping pressures with greater contact lengths than in other standard connectors.
3. Completely independent (3-piece) clamping on main and tap. Connection can be removed on one side without disturbing contacts on the other. Most other connectors are 2-piece.
4. Conductor range practically eliminates misapplication and resulting connector "burn-downs". Limited or no range of other connectors invite misapplication trouble.
5. Wider conductor ranges permit considerable reduction in overall number of connectors which must be carried in inventory. Two and three times greater inventory is required with other connectors.
6. More connector for the money! More metal... 8 bolts instead of the ordinary 6 bolts!
7. One of the greatest advantages of these Anderson Vers-a-groove Tee Connectors is ease of installation. The 3-piece design, with independent clamping on main and tap, means that tap conductors may be bolted in on the ground and passed up to install over the bus runs. Ordinary 6-bolt, 2-piece connectors much more cumbersome and difficult to handle.
8. Cast surfaces which are inherently rough and tough mean positive electrical contacts. This feature plus the greater clamping strength of these connectors is a distinct advantage in overall efficiency.
9. The design of these connectors, by Anderson, has proved itself over more than 27 years of service under all conditions in all parts of the country. Once used... tried and proved... no customer has ever switched back to an ordinary connector.

For more complete information, including engineering and design data, performance characteristics and other particulars, consult your nearest Anderson Representative, or write to our home office.

ANDERSON BRASS WORKS INCORPORATED BIRMINGHAM, ALABAMA

Aluminum & Bronze POWER CONNECTORS • CLAMPS • FITTINGS • ACCESSORIES for SUBSTATION • TRANSMISSION • DISTRIBUTION SYSTEMS for over a Quarter Century



Double Side-Break Switch

(29) Southern States Equipment Corp., Hampton, Ga.

High-pressure contacts, a minimum number of current interchange points, shuntless design and wide-angle blade rotation to open or close are reported features of this new side-break switch. It will be offered in voltage ratings of 34.5 kv and above and in continuous current ratings of 600, 1,200 and 2,000 amp.

Dual-Purpose Wire

(30) Anaconda Wire & Cable Co., 25 Broadway, New York 4, N. Y.

A new dual-purpose wire offered by this company is said to be usable for both a building wire and a machine tool or appliance wire. Benefits include the stocking of only one kind of wire for the two purposes. The manufacturer recommends it for applications where continuously high temperatures are common. Available in sizes 14 AWG to 2,000 MCM when used as TW; in sizes 14 to 4/0 AWG when used as an appliance wire.

Service Entrance Panel

(31) General Switch Corp., 45 Roebling St., Brooklyn 11, N. Y.

Six independent, two fuse pull-out switches and 12 plug fuse branch circuits are contained in this single service entrance enclosure. Rated at 125 amp, the equipment provides two 60-amp and four 30-amp pull-out switches.

(32) COMMUNICATION SYSTEM — Talk-A-Phone Co., 1512 S. Pulaski Rd., Chicago, Ill., has introduced a communication system that allows private or conference conversations without the use of controls while talking. Available in 10- or 20-station capacities.

(33) THREE-IN-ONE TAP — The three most common sizes of threads are on one tap tool offered by Tri Tap Tool Co., Box 293, Carlsbad, Calif. Thread sizes are 6/32, 8/32 and 10/32, and the tool itself comes in three forms: as a tap, tap with a permanent handle and tap with removable handle. Screwdriver and Phillips bit are available for the removable handle tool.

it's NEW!
it's 833.33% more versatile!
BURNDY RANGE-TAKING STUD CONNECTOR NDR—
12 sizes with the scope of a hundred . . . designed to meet E E I-NEMA specifications . . . to accommodate cable from #6 solid copper to 2,000 MCM copper; ⅜" copper I.P.S. to a 1¼" copper I.P.S. tubular bus and flat bar. Here's your chance to eliminate a lot of stock-keeping: these 12 items do the work of a hundred!
Constructed of high copper alloy, the NDR stud connector features a reversible cap that permits the full cable, flat bar, or tubular bus range to be taken either in line with the stud or at right angles to it.
Only one wrench is required for installation.
for vertical taps
for horizontal taps
Write for Burndy advance catalog data sheet Stud Connector Type NDR.
BURNDY
55-14

Norwalk, Connect. • Toronto, Canada • Factories: New York, California, Toronto • Export: Philips Export Company

1894 Induction Watthour Meter

Commercial measurement of a-c energy made possible by O. B. Shallenberger's invention of the first induction watthour meter. Discovery hastened success of a-c systems.

ANOTHER WESTINGHOUSE FIRST . . .

New single-disc design brings single-phase performance to polyphase meters

Once again Westinghouse brings you a significant advance in the science of metering—a polyphase meter of a basic new design. It provides the same outstanding performance characteristics found in single-phase watthour meters. This means that you can apply polyphase meters with the assurance that they will handle all present and future loads.

To give reliable single-phase performance to its DSP and DAP polyphase watthour meters, Westinghouse adopted the single-phase electromagnet in a single-disc-type construction. The new polyphase design is smaller than previous similar types, contains fewer parts. Result: it's easier to handle, install and maintain.

Here are some additional noteworthy features:

Accuracy—by unique design, new meter utilizes a single-phase disc and electrically eliminates interfet ence between elements.

Extended range—gives straight-line accuracy up to 667% of rating to handle present and future loads.

Ease of calibration—only three adjustments—light load, full load and phase balance—readily accessible at front of meter.

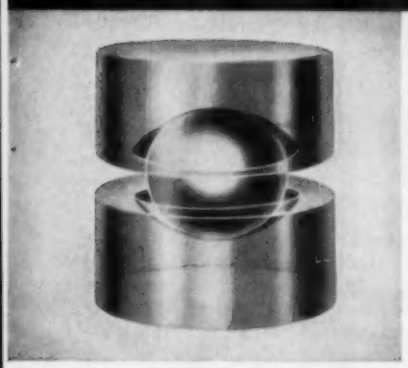
Built-in protection—co-ordinated materials minimize corrosion. Coil insulation raised to 10,000-volt impulse. De-ion® surge protection gaps discharge outside meter.

FOR MORE FACTS: Call The Man With The Facts... your Westinghouse sales engineer. Ask him for a copy of B-6398, or write Westinghouse Electric Corporation, 3 Gateway Center, P. O. Box 868, Pittsburgh 30, Pa.

J-40483

YOU CAN BE SURE... IF IT'S Westinghouse

METERING PROGRESS PIONEERED BY WESTINGHOUSE



1902 Ball and Jewel Bearing

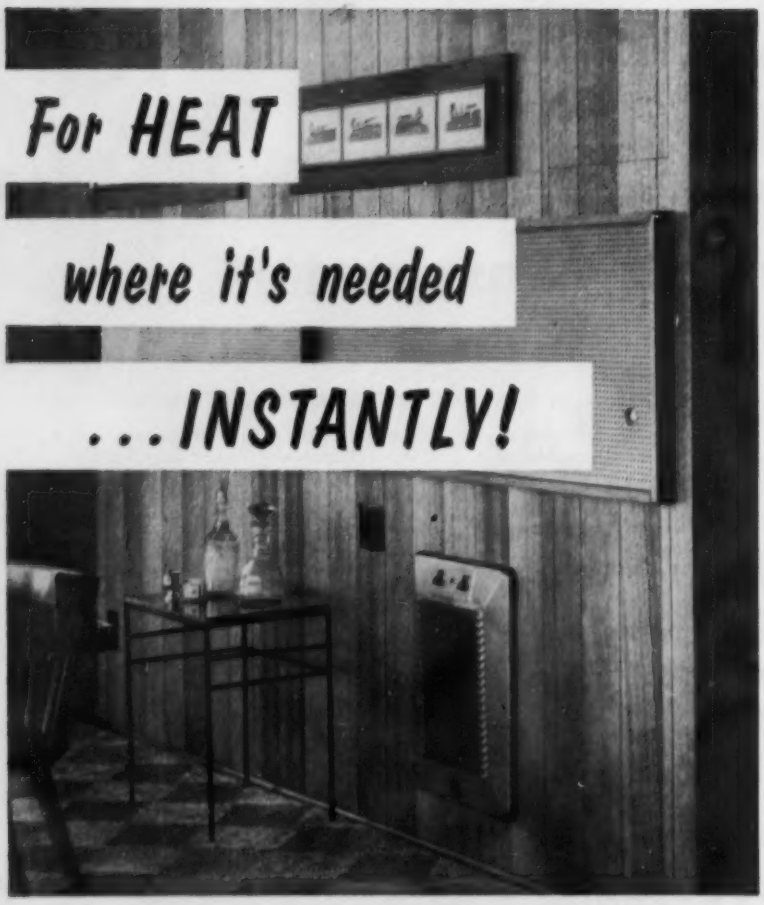
Long-time accuracy was assured by stability of ball and jewel bearing assembly. This design has been proved by millions of meters in service.

1918 Thermal Demand Meter

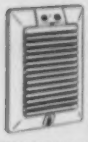
First practical answer to extension of demand rates to small, irregular loads. It featured bimetallic spring unit, led to introduction of combination thermal watthour meter in 1940.

1933 Socket Meter

The introduction of the socket meter in 1933 paved the way for outdoor metering—an outstanding contribution to the economy and simplicity of metering.



Install THERMADOR
***Bilt-in Electric* Wall Heaters**

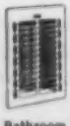

"Master Duty" Wall Heat-Fan

Thermador Electric Wall Heaters satisfy all the heating demands of your buyers. A flick of a switch instantly delivers a surge of clean, healthful warmth. Scientifically designed heating element, fan and louvers direct the heat toward the cold floor. From there the heat rises, warming the "Living Zone"... quickly, safely, economically. Room-by-room heat control allows heating of just those areas where heat is desired. Heat your homes with Thermador ... so efficient ... so clean ... so easy to install ... and the fastest heaters made! There's a type and size for every room.

Fan or Radiant Models • Convenient Top Switches • Optional Thermostat Control • Sun Bronze, White or Stainless Steel Finishes On-Off Indicator Lights • Approved by Underwriters' Labs., Inc.

"Medium Duty" Wall Heat-Fan

Bathroom "Head-to-Heels" Radiant Heater


Bathroom "Space Saver" Radiant Heater

THERMADOR Electrical Manufacturing Co.
A Division of Norris-Thermador Corporation
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Manufacturers of Bilt-in and Console Electric Ranges, Electric Water Heaters, Evaporative Coolers, Ventilating Fans.

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Please send me information and literature on
☐ Bilt-in Electric Wall Heaters ( ) (Other Products)
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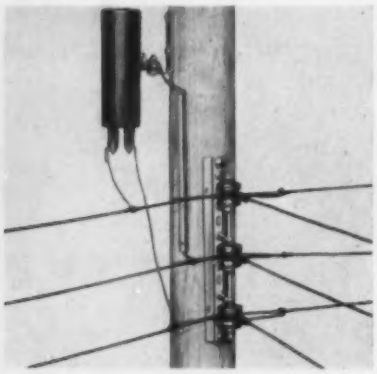


Secondary Capacitors

(34) Line Material Co., 700 W. Michigan St., Milwaukee 1, Wis.

New three- and five-kvar, single-phase, 240-v capacitors designed for power factor correction on secondary distribution circuits are announced by this company. Terminal mounted fuses are available if needed. The units can be mounted with bushings up or down and are furnished either with a two-hole mounting bracket or a standard EEI-NEMA crossarm mounting bracket. Steel tanks are protected by a new L-M finish process.

Accounting Machine

(35) Underwood Corp., 1 Park Ave., New York, N. Y.

This company's multiregister accounting machine writes, adds and subtracts as rapidly as an operator can type, according to the manufacturer. It is designed with a standard typewriter keyboard and provides true credit balances and automatic totals in every crossfooter and register. It is stated that any typist can perform all the basic bookkeeping functions with the machine.

Service-Entrance Device

(36) General Electric Co., Trumbull Components Dept., Plainville, Conn.

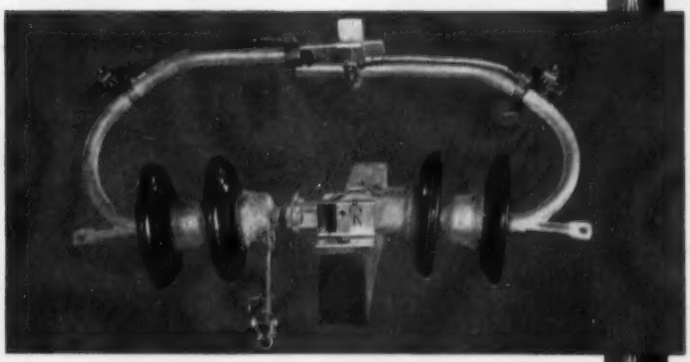
A meter socket and circuit breaker load center for residences are packaged together in this new service-entrance device. Benefits are said to be wiring economies and installation and service convenience. Available with six or eight branch circuits, 120/240-v a-c rating.

(37) COMPARISON—An instrument for rapid comparison tests has been announced by Industrial Development Laboratories Inc., 17 Pollock Ave., Jersey City, N. J. Tests over resistance or impedance range of 100 ohms to 5 megohms.

Compare pole top appearance!

KPF Switches

modern functional attractive



KPF Air Break Switches look different because they are different. Their pole top appearance is neat and uncluttered. There is a "straight-through" cleanliness of line—the visual appeal of design simplicity.

With this simplicity goes operating dependability and long life. There are no delicate mechanisms to malfunction, freeze, lock from cross-arm warping, need lubrication or wear out. This same simple construction also saves weight. KPF phase units weigh about the same as a comparable insulator stack. Double cross-arms and extra bracing are not needed. Installation is faster and less expensive.

KPF Switches have proved themselves in nearly a half century of major system operation. Why not get the details and make a test installation.

KPF
AIR BREAK SWITCHES
Standard for nearly half a century

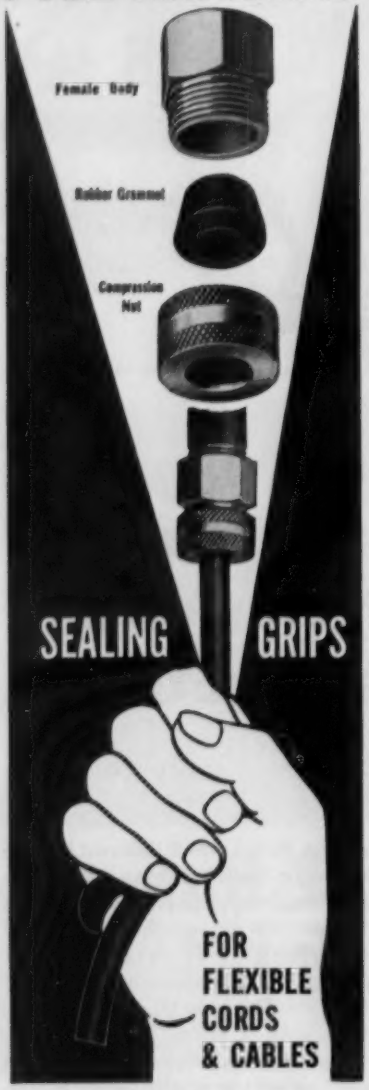
For catalog and complete specifications, write direct

KPF ELECTRIC COMPANY

Dept. W. 1624 E. Alpine Avenue
Stockton 5, California

3462

PYLE-NATIONAL



Protect electrical equipment and keep maintenance cost down!

Pyle accurately-cut tapered threads and tapered rubber bushings prevent strain on terminal connections and prevent moisture or dirt from entering wiring compartments or mechanism enclosures.

Available in a variety of styles and sizes including types with hexagon nipple for anchoring in sheet metal panels, etc.

Sold nationally through electrical distributors. Write today for Bulletin.

THE PYLE-NATIONAL COMPANY

1364 N. Kostner Ave. Chicago 51, Ill.

BULLETINS ETC.

(38) TRANSMISSION TOWERS—Bulletin 2509 of Blaw-Knox Co., Farmers Bank Bldg., Pittsburgh, Pa., describes the company's line of transmission towers. Address requests to the Structural and Tower Department. Covered in the publication are body and leg extensions to double- and single-circuit towers in order to obtain desired height and meet uneven ground conditions.

(39) MOTOR CONTROL—Cutler-Hammer Inc., 315 N. 12th St., Milwaukee 1, Wis., offers a 42-page booklet designed as a help in selecting electrical components for air conditioning, heating, ventilating, pump and compressor equipment. Data for assistance in motor control selection are carried.

(40) INCREASING RATINGS—A new approach to step-regulator application as a possible solution to the load-growth problem is contained in a leaflet entitled "How to Increase Step Regulator Ratings" released by Allis-Chalmers Mfg. Co., 939 S. 70th St., Milwaukee, Wis.

(41) POWER DERRICKS—J. H. Nolan Corp., 4100 W. 150th St., Cleveland 11, Ohio, is offering a descriptive bulletin about its Nolan series 3700 power derricks. The bulletin gives design features and performance data for handling loads up to six tons.

(42) ELECTRIC SPACE HEATING — Full-color literature published by Electromode Corp., Rochester 3, N.Y., shows the company's home heating units in full-color photos in various applications. Types of electric heaters covered include wall, portable, radiant panel, baseboard and ceiling radiant cable heat. Ask for form EC-165.

(43) CORE FORM TRANSFORMERS—Single-phase core form power transformers 10,000 kva and above, and three-phase units 15,000 kva and above are described in this 24-page booklet. Electrical and mechanical design and principal accessories are covered. Ask for catalog 4455, Pennsylvania Transformer Co., Box 330, Canonsburg, Pa.

(44) AUTOMATIC CONTROL — Wheelco Instruments Division of Barber-Colman Co. is offering Educational Bulletin No. 9 to those interested in the application of automatic control equipment to industrial processes. Rockford, Ill., is the address.

(45) SAFETY SERVICES GUIDE—The National Safety Council's 1955 Occupational Safety Services Guide lists tools and training aids available to company safety directors. Ask for Service Guide 2.1 by writing the Council at 425 N. Michigan Ave., Chicago 11, Ill.

(46) SUSPENSION HARDWARE—The complete line of Line Material Co.'s strain and suspension hardware is carried in a 44-page illustrated catalog designated bulletin DL8A. Write to the company at Milwaukee 1, Wis.

(47) WIRING REELS—A trade net price sheet of Hykon Mfg. Co. wiring reels and measuring equipment is now available. Address of the company is 163 E. State St., Alliance, Ohio. Contains illustrations, specifications and prices.

(48) TEMPERATURE CONTROL — Electronic control of heating and air conditioning equipment is discussed in a booklet now available from Minneapolis-Honeywell Regulator Co., 2926 Fourth Ave. S., Minneapolis, Minn.

KILL TWO BIRDS WITH ONE STONE — Fill out this coupon and get back valuable information from as many sources as you indicate.

ELECTRICAL WEST
68 Post St., San Francisco 4, Calif.

Not good after January 1

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* Please include your company's name and your position, as we cannot ask manufacturers to furnish literature unless you do.

This 10-minute demonstration will prove it...

The New QO is the Finest Breaker Ever Built!

In announcing Square D's new NQO circuit breaker lighting panelboard line, we made this statement—*"this panelboard offers you the finest breaker ever built."*

Ever since we made that statement, Square D Field Engineers throughout the country have been *proving* it by means of the very concise and conclusive demonstration pictured above.

If you haven't seen this demonstration, your Square D Field Engineer will be glad to set up a time to meet your convenience. We're sure you'll find it ten minutes well invested.

ASK YOUR ELECTRICAL DISTRIBUTOR FOR SQUARE D PRODUCTS

SQUARE D COMPANY

ELECTRA'S HUSBAND

"WERE you ever a debater?" I asked Electra one evening last month just after she had finished listening to an installment of "One Man's Family."

"No, but my brother was when he was in high school," she answered. "Why?"

"Well I'm trying to make up my mind whether Senator Neuberger or Congressman Coon of Oregon won in a series of ten debates up in that state," I explained. "They were debating whether or not the John Day Dam Bill was in the public interest—Coon for and Neuberger against."

"What's the damned John Day Bill?" she asked innocently.

"It's the John Day Dam Bill and it authorizes the construction of another big power dam on the Columbia River. Only in this instance instead of the federal government doing the whole job, local public agencies — the private power companies — would put up $273,000,000 to finance that part of the project chargeable to power," I continued patiently. "Actually it is going to take expenditures of $1,000,000 a day for the next ten years to give the Pacific Northwest enough power. In the light of experience it seems fairly clear that the federal government isn't going to spend that kind of money. Furthermore ever since the federal government started its Northwest power developments, the local agencies have had to build at least half of the new power plants themselves. This is simply an instance where the local people are ready to proceed in the partnership program of power development."

"Whoa! Wait a mainute," she interrupted. "Who are you debating with? I didn't bring this subject up. In fact I'm not sure I want to know anything about it."

"Well how can you help me make up my mind if you don't know the facts?" I argued.

"Your mind usually is made up in advance so why bother," she mused.

"Oh, come now," I reasoned, "you know better than that. Let me sum up Senator Neuberger's arguments for you. His predominant points were that the federal power program had given the Pacific Northwest low-cost power, which, in turn, had meant the greatest industrial growth in history, electrification of farms and rural areas, and an abundance of power for domestic and small business users. He contended that the private power companies have embarked on a full-scale drive to wreck the federal program and to prevent any further development. Finally, he insisted that, if the private companies were successful in destroying the federal system by taking over the best low-cost sites on the Columbia River, the utilities would cause economic and industrial stagnation because of high rates and irresponsible service."

PARTNERSHIP FOR PROGRESS?

"Wow! That ought to make you mad," she exclaimed.

"It does because it is so much at variance with the facts," I said. "But that isn't all that the Senator said. He claimed that the cost of power would be higher because the utilities were guaranteed a profit of 6 to 9% on their investment. And he insisted that industrial development would cease because the companies sold industrial power at an average rate of 8.2 mills per kwh against the Bonneville rate of 2.2 mills. Also he stated that the John Day Bill would remove the preference clause from the sale of federally generated power."

"How can I help you decide unless you tell me what the other congressman said?" Electra interposed designedly.

"One of the things Congressman Coon emphasized was that Oregon's two senators were deliberately blocking any new power construction in the Pacific Northwest in order to create a political issue for the 1956 election," I said. "Another charge that he made was that Senator Neuberger is opposed to the bill because he hopes to see a power shortage. Once such a shortage develops, according to his theory, the people of Oregon, acting under severe stress, might turn to public ownership in order to be in a position to get power under the preference provisions of the Bonneville Act.

"You see there isn't a really equitable disposition of public power at present. Congressman Coon said that because of the interpretation of the preference clause and the contractural commitments to industry, 75% of the area's federal power is being distributed in Washington and only 25% in Oregon. He insists that the original 1906 preference clause was designed to give preference for federally generated power for municipal purposes and for small users. Today's interpretation gives preference to public agencies that sell large blocks of such power at a profit to industrial and commercial users as well as to domestic and rural customers."

"So what?" she commented with just a little boredom.

"Do you think it's right to discriminate against the people of Oregon just because they happen to prefer to have their electricity delivered by free enterprisers?" I asked.

"I don't like any kind of deliberate discrimination," she agreed.

"To get on with the debate," I continued, "Congressman Coon pointed out that Oregon private utilities sell power comparable to that delivered by the federal government wholesale to big industries at rates as low as 2½ to 3 mills per kwh, not 8.2 mills as Senator Neuberger contended. He also blasted the Senator for saying that the private utilities were guaranteed exorbitant profits.

"Who do you think won?"

"It's my guess that it was pretty much of a standoff," I said. "The debates probably won't affect the passage of the John Day Dam Bill in Congress. It likely will get mired down in the political jockeying that will go on from now until next year's elections. Folks agree generally that the debates did clarify the whole subject of local-federal partnership. They established a base from which a good energetic campaign can be developed to sell the partnership philosophy. One significant fact was that Congressman Coon received his greatest applause each time that he said he was for private enterprise—the peanut vendor or a large, good corporation. The debates were like most of ours—a draw."

"What do you mean a draw?" she asked slyly. "You win all of the debates in our house—that is, when I let you."

Through 500 KVA

PROOF of Insulation Quality

on all Allis-Chalmers distribution transformers through 500 kva, 69 kv and below is now shown on every unit. The "Impulse Tested" Seal is put on to show that each unit has been checked with the most modern impulse testing equipment and techniques known to the industry.

Production-line impulse testing was initiated by Allis-Chalmers eight years ago for pole-type units. Now these tests that assure insulation quality are made on every distribution transformer shipped by Allis-Chalmers, including both conventional and self-protected units.

Tests are made without lightning arresters. Allis-Chalmers checks the transformer, not the lightning arrester.

Get the facts about these and other Allis-Chalmers tests and manufacturing procedures that result in distribution transformers of the highest quality. Call the A-C office nearest you, or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin. A-4851

EVERY

Allis-Chalmers Distribution Transformer gets this test of Quality

A-C ALLIS-CHALMERS

ALLIS-CHALMERS

Personalized discussions on distribution transformer trends are helping many utilities plan for future load growth. Here, C. E. Sutton, Jr. (standing), Manager—Distribution Transformer Sales, reviews industry's total investments, trends in equipment types that promise help in system expansion.

Continued rapid growth in residential load suggests

NEW LOOK AT YOUR DISTRIBUTION EXPENDITURES

New distribution transformer plant, G.E.'s 20-million-dollar Hickory Plant being built in North Carolina, demonstrates G.E.'s confidence in the continued huge growth of domestic load. Here, J. T. Elrod (left), Manager—Marketing, and R. W. Smith, General Manager, of G.E.'s Distribution Transformer Dept., view architect's drawing of new plant.

Utilities may invest 1.5 billion in distribution equipment by 1963

While today's dollar and man-hour investments in generating equipment still tend to hold the headlines, many electric utilities are finding that they can benefit greatly by re-evaluating their distribution system needs of the future.

PLANNING NECESSARY

With domestic load growth showing all indications of tripling by 1965, many utility men recognize that this year's 182-million-dollar investment in distribution equipment may easily soar to 479 million by 1963. This huge expenditure demands sound planning for the future if utilities are to expect to expand their distribution systems economically and effectively.

FUTURE FLEXIBILITY

From the system designer's standpoint, these statistics present a challenge—and an opportunity—for far-sighted thinking. Study of kva, voltage, protection, and phase, for example, open new avenues for planning to meet today's system demands and at the same time allow sufficient flexibility to accommodate the tremendous load growth on the horizon.

Has your company taken a new look at your distribution system investments lately? Full information to help system planners is available from your local G-E Apparatus Sales Representative. General Electric Company, Schenectady 5, New York. 301-105

MORE POWER TO AMERICA

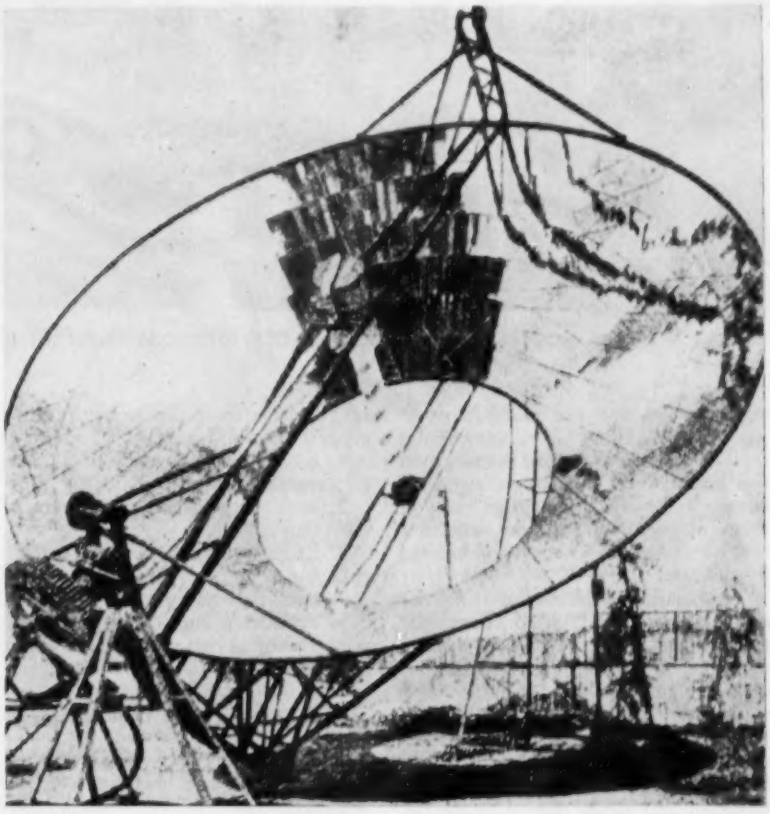
GENERAL ELECTRIC

ELECTRICAL WEST SPOKESMAN FOR MOST HIGHLY ELECTRIFIED REGION OF THE U. S. VOL. 115 No. 5 NOVEMBER 1955

How soon can we utilize

Power From the Sun ?

Guy Benveniste
Research Engineer
Stanford Research Institute



Concentrator for 10-hp solar plant built in 1900 by A. G. Eneas at Ostrich Farm, Pasadena

Most of the power we use today comes from the sun. The fuels we burn —nuclear power, hydro power, wind power—all originated in the sun. The only exception is tidal power which, after all, owes more to the moon than to the sun. The growing energy requirements of the world and the inevitable depletion of our conventional fuel reserves will leave only two energy resources to carry the greater part of the world's energy loads in 50 or 100 years from now: atomic and solar energy.

It is conceivable that solar energy will be widely used by that time to satisfy space-heating needs that already represent approximately one-third of our energy requirements. Solar power may also play a complementary role in the future, mostly in areas where lack of transportation and industry would render the use of atomic power impractical and expensive. Even today solar power may be used instead of gasoline engines with high-cost fuels in isolated lumber camps and small villages to run engines and pumps during sunny hours.

In certain areas of the world where few other energy resources exist, a great deal of sunshine is often available. In some deserts of Africa, in the Southwest of this country, in the middle east, and in Australia, good use could be made of cheap power for irrigation pumping to help transform parts of these deserts into agricultural communities. The challenge has been present in the minds of many men for a long time, but until now no such cheap source of solar power has been developed. It may be useful once again to examine the state of this art and its peculiar problems.

The amount of solar energy reaching the earth outside its atmosphere averages about 1.35 kw per square meter. All this energy does not reach the earth's surface; some is reflected or absorbed by gas molecules, water vapor and dust particles. The amount actually reaching the earth's surface depends on the clearness of the sky and the air mass which the radiations must penetrate. At high altitudes at noon a large percentage of this energy is received on a horizontal surface, perhaps as high as 1.25 kw per square meter. At sea level the amount is less and at latitudes within the temperate and the torrid zones 0.9 to 1.1 kw per square meter are not uncommon at noon during clear days.

In dry desertic climates more than 300 sunny days per year may be expected. In a good clear climate similar to much of our Southwest, we may expect nearly 300 sunny days per year. In such localities it is possible that 2,200 to 2,500 kwh per square meter are incident each year on a horizontal surface. If a tracking mirror is used to follow the sun during the day, perhaps as much as 3,000 to 3,200 kwh per

Fig. 2—One of 205-ft collectors at 60-hp Maadi plant built in 1912. Right: One of 26 collector banks used at Shuman plant built in 1911

square meter are available. In other words, the roof tops of ordinary homes receive more energy from the sun than the homes receive through electrical wires. Naturally this is true only in areas of plentiful sunshine, and not every home in this country is located in such areas.

The major problems in using the sun's energy are twofold. First, the energy must be collected over a large area. To obtain 100 kw, assuming an over-all plant efficiency of 10%, 1,000 square meters or more than 10,000 sq ft are required. This space requirement indicates that solar power will probably always be best utilized in relatively small installations of 10 to 100 kw, perhaps 1,000 or even 10,000 kw, but surely not 100,000 kw. The large collecting surfaces required have been until now the major contributors to the cost of solar power; until inexpensive and efficient collecting surfaces are developed cheap solar power will not be just around the corner.

The second difficulty is caused by the intermittent nature of sunlight. Since the sun does not shine at night or during cloudy days energy must be stored if service is required during such periods. Unfortunately, no cheap power storage device has yet been produced although many research efforts are directed toward solving this particular problem. As long as inexpensive storage is not available the use of solar power will be mostly limited to isolated rural loads where intermittent service is acceptable and loads can be turned on only when the sun shines.

Most of the work done in the past with solar engines was carried on during the period from 1870 to 1914, while present research efforts began after World War II. The more important approaches to the problem can be classified as follows:

1. Steam engines using collectors concentrating solar radiations.
2. Low-temperature engines using flat-plate collectors.
3. Engines with selective surface collectors.
4. "Solar batteries."
5. Production of hydrogen by the photochemical breakdown of water into its elements.

Steam Engines Using Concentrating Collectors

Early Experiments—Most of the work with concentrating reflectors conducted before the first World War was with low-pressure and low-temperature steam engines. There were many designers and many models were built. Probably the most famous experimenters were Mouchot (1860-1880) and Pifre (1878) in France, and Ericsson (1864-1888), Eneas (1900), Shuman, and Boys (1906) in the United States.

The culmination of all these experiments was the installation in 1900 of a 10-hp plant at Ostrich Farm, Pasadena, by A. G. Eneas (Fig. 1) and the construction by Frank Shuman and C. V. Boys of the 60-hp Maadi solar plant near Cairo, Egypt (Fig. 2).

All these concentrating devices usually had the same characteristics: concave reflectors—often a long parabolic cylinder section concentrating sunlight on a dark boiler tube where steam was generated at low pressures and low temperatures; the concentration ratio used was rarely above one to ten; and the over-all efficiency of conversion of sunlight into mechanical power was low. The most efficient installation, the unit at Ostrich Farm, is reputed to have reached 12%, but this figure may be optimistic.

Different mountings were used, but in most instances the entire collecting surface and the boiler had to be supported on a movable frame which could track the sun with a suitable clockwork arrangement.

Results of these early experiments were not satisfactory. The equipment was expensive and bulky. The exposed boiler tube lost much heat. Considerable power was spent tracking the sun and reversing the position of the reflectors and boilers each morning. The low pressures and low temperatures resulted in low operating efficiencies. Coal was evidently cheaper and more practical; research was discontinued.

Recent Developments—In this country Dr. C. G. Abbot of the Smithsonian Institution has developed through the years several small solar engines using special flash boilers that permit nearly immediate steam generation after exposure to sunshine. A ½-hp engine was exhibited at the International Power Congress at Washington in 1936 and another model was exhibited at the World Symposium on Applied Solar Energy in Phoenix in October of this year.

Research has also continued abroad. The National Physical Laboratory of India has experimented with hot-air engine cycles, using reflectors, a heat exchanger and small air engines of 1/8 to 1/6 hp. Various prototypes were built, and work was performed at temperatures above 1,000 F. The heliotechnical laboratory of the Energy Institute of the G. M. Krzhizhanov Academy of Sciences of the USSR has experimented during recent years with various solar steam boilers, using cylindro-parabolic and parabolic mir-

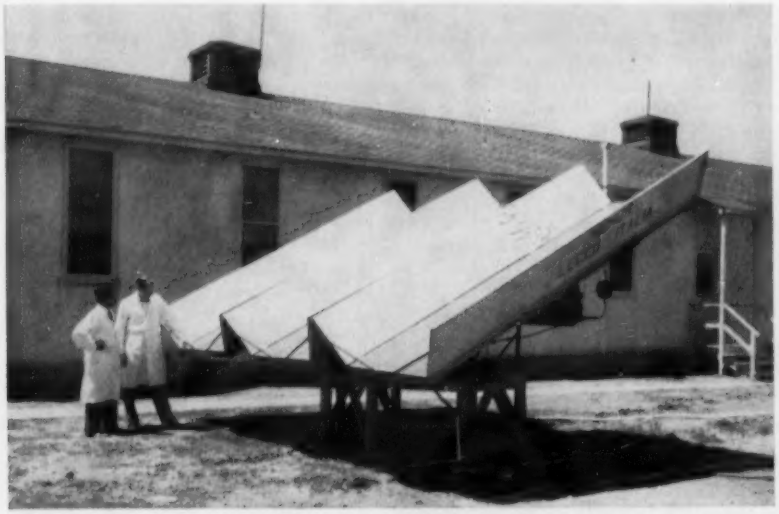


Fig. 3—Design of the flat-plate collector of the SOMOR pump now in Menlo Park, Calif.

rors.[8] This laboratory has built a large 33-ft aperture parabolic mirror to generate steam at seven atmospheres and also more ordinary cylinder-parabolic boilers of the Shuman variety.

It is doubtful that any of the engines developed to date have been particularly economical. The economical solution to this problem lies in developing an inexpensive concentrating surface with a concentrating ratio sufficient to obtain superheated steam at a temperature of, say, 600 F and 600 lb which would permit higher cycle efficiency. At this temperature it is imperative to protect and insulate the boiler to keep reradiation, convection and conduction losses to a minimum. This can be done easily if the concentrating mirror and focus boiler are stationary. A black body cavity can then be used. Such a mounting is being planned at Stanford Research Institute. The stationary concentrating surface could be a large stationary cylindro-parabolic surface built on an ordinary fence. With a concentrating ratio somewhat below 1 to 100, steam at 600 F 600 lb would be generated in the boiler. Auxiliary flat tracking mirrors (heliostat) would be used to tract the sun. Preliminary studies indicate that the probable over-all efficiency of this mounting would be: collector and boiler efficiency 65%; theoretical Rankine cycle efficiency 37%; engine efficiency 75%; over-all efficiency 18%.

It is estimated that such solar plants could generate power at about 2¢ per kwh (assuming maximum plant load factor and fixed charges at 12%). Two cents per kilowatt-hour is certainly not cheap power for the large steam plants we are familiar with, especially when this power is available only during certain hours of the day, but it may be cheap power in isolated rural locations the world over.

Mass-production techniques could probably further decrease these costs.

Low-Temperature Engines Using Flat-Plate Collectors

The flat-plate "heat trap" has come into vogue again in recent years. Shuman, in 1907, used such a collector to generate power with ether as working fluid. This type of installation consists usually of a black metal surface with tubing to circulate the working fluid, a glass cover (usually one or two sheets of glass and air spaces), and suitable heat insulation below the metal plates.

The flat-plate collector is heated by the sun, the glass covers "trap" the radiations, the fluid is heated, a small temperature - differential is obtained and a low-temperature pressure engine may operate. This is the general principle behind the solar pumps manufactured and marketed by the SOMOR Co. of Lecco, Italy. (One SOMOR unit under test at Stanford Research Institute utilizes sulfur dioxide as working fluid.) The collector can be mounted on a carriage and partially track the sun during the day or it can be stationary. (Fig. 3.)

The efficiency of these units is usually low. The surface heated is large and, unless considerable care is taken to insulate the collector, high heat losses will occur as the operating temperatures are increased. While flat-plate collectors with one or two glass covers and suitable insulation can be expected to operate at about 50% efficiency when collecting heat at about 25 C (77 F), this efficiency is not maintained at higher temperatures. It is therefore usually preferable to employ fluids with low boiling point instead of steam, and to operate engines between very narrow temperature limits. With such fluids as Freon or sulfur dioxide, an engine operating between 30 C and 70 C could do so with the following maximum efficiencies: collector efficiency 50%; theoretical cycle efficiency 11%; engine efficiency 75%; over-all efficiency 4%.

Average daily operating efficiency will be even lower than these maximum figures since heat is lost in the morning to heat the installation. Most units will not operate below a threshold solar intensity which must be sufficient to raise the temperature high enough to permit boiling. It can be assumed that daily efficiency of such units will vary between 3 and 4%.

These units must depend on the availability of a suitable heat sink. The SOMOR pump must rely on the water it pumps to cool its condenser. Since the temperature range is very narrow a slight variation in the temperature of the cooling water will affect the efficiency.

Preliminary economic studies conducted at Stanford Research Institute indicate that present-day cost of solar power obtained from flat-plate collector installations is about 5.5¢ per kwh (assuming 12% fixed charges and maximum plant load factor).

Hoping to increase the efficiency of flat-plate collectors, researchers have worked with selective surfaces. A selective surface can be obtained as a good absorber of sunlight and a poor emitter of thermal radiations. Sunlight comes mostly in short wave lengths of 300 to 2,000 millimicrons. On the other hand (from Wien's displacement law) the thermal radiations emitted by a body heated to about 300 to 400 C has wave lengths mostly above 2,000 millimicrons.

A selective surface is therefore absorptive to short wave length radiations and reflective to longer wave lengths. It absorbs sunlight readily and emits little thermal radiations. Dr. H. Tabor of the Research Council of Israel has recently reported developing such a surface for use in a solar power collector.[12] Even with such a selective surface the collector still requires a glass cover to reduce convection and conduction heat losses. Tabor believes that such a surface with the space between the metal and the glass evacuated could yield an over-all efficiency of 14% and a temperature of 321 C. If no vacuum is used, the estimated over-all efficiency is not much above 5%. A pilot plant is now being built in Israel and the answer to

8 and 12. See Bibliography, p 74.

such questions as cost, average efficiency, maintenance, etc., are to be reported by Tabor at the Conference on Solar Energy in Tucson which was to take place on Oct. 31, 1955.

Solar Batteries

The so-called "solar battery" is really not a battery but a solar converter. Solar energy is directly converted into electricity in a photovoltaic cell.

Since Becquerel first observed the photovoltaic effect in 1839 much work has been carried on with photocells which consist of junctions of certain metals and semiconductors. These cells are often used in light meters and light-operated control relays. Such cells generally operate at efficiencies of a fraction of 1% or less and, as such, are not too practical as converters of solar energy. However, the more complete recent knowledge of semiconductors has enabled the prediction of more favorable combinations of materials and has also furnished the techniques whereby such materials can be produced.

Various laboratories in this country have developed such photovoltaic converters. The converter developed by the Bell Laboratory consists essentially of a silicon crystal with a small amount of arsenic impurity covered with a very thin layer of boron impurities (about 0.0001 in. deep). The size of the crystal so prepared is about ½ in. diameter and 0.04 in. thick. A number of such small crystals or "wafers" may be connected in series and assembled on a common backing, thus converting solar energy into electricity at convenient d-c voltages. The over-all efficiencies actually obtained until now were reported at about 11%.

These cells cannot convert all frequencies of sunlight, and their maximum over-all theoretical efficiency is about 22%. These surfaces are expensive since they must be produced slowly and they require a very accurate control of the proportioning of the impurities. The limits imposed by the small size and high cost of the crystals would indicate that these units will best be used in communication equipment where power output requirements are low and small surfaces useful. Further research may ultimately yield a converter for power purposes.

Hydrogen by Photochemical Breakdown

Probably one of the most promising attempts at converting solar energy to power is through the production of hydrogen by the photochemical breakdown of water under exposure to sunlight. Several reactions by which water is dissociated into oxygen and hydrogen are known. Dr. L. J. Heidt at Massachusetts Institute of Technology has been working for several years with reactions using ultraviolet light and solutions containing ceric perchlorate and perchloric acid. The maximum theoretical efficiency of this reaction is low since only a small portion of the sun's spectrum can be used. Until now only small quantities of hydrogen have been obtained.

Dr. R. Marcus at Stanford Research Institute has been experimenting with different reactions to obtain hydrogen and oxygen. Since water is transparent and cannot directly absorb the visible part of the spectrum, it is necessary to add light-absorbing materials or photocatalysts to the water. These photocatalysts use energy from sunlight to initiate the decomposition of water. The first product of such decomposition will be either hydrogen or oxygen, while the other component of water will be liberated in the regeneration of the photocatalyst. It is still too early to know whether this research experiment will be successful, but if it should be fairly high maximum efficiencies of the order of 30 to 40% could be expected.

The obvious advantages of obtaining hydrogen in such a reaction are: (1) The collecting surface could be relatively simple, requiring no insulation, and would therefore be inexpensive; (2) hydrogen can be stored easily and simply; (3) hydrogen could ultimately be converted into electrical energy at very high efficiency in hydrogen-oxygen fuel cells such as those now being developed in England.

The hydrogen-oxygen fuel cell now being developed by F. T. Bacon and T. M. Fry at Cambridge University produces electricity directly by converting hydrogen and oxygen into water. These cells are reported to have operated for about 1,000 hours at 65% efficiency. Owing to the relative over-all lightness of the fuel cells and the stored fuels these units may be very useful in the transportation field; their potential importance therefore becomes obvious. An over-all conversion efficiency from sunlight to electricity of 26% would not be impossible. This research may be a step ahead in finding ways of storing and using solar energy.

Conclusions

From simple mirrors concentrating sunlight on an exposed boiler tube to the production of hydrogen by the chemical decomposition of sunlight the road is a long one. Perhaps the road will be much longer before sunlight can be easily converted to furnish power at any time of the day.

The problem appears to lie in four areas:

1. The high first cost of collecting surfaces.
2. The low over-all efficiency of the conversion process.
3. The additional cost of storage or, in the absence of storage, the resulting low plant load factor.

More basic research and many more ideas are needed to solve these problems. Perhaps 100 years from now the young helio-engineer just graduating from school will be as familiar to our children as the steam plant man is familiar to us. Let us hope so.

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For only 1.75% of the $22,000 to $23,000 selling price of these attractive three-bedroom homes, tract developer . . .

Buys High-Grade Underground

Fred Milam, Pacific Gas and Electric Co.

To help obtain the parklike appearance so desirable in modern residential areas, the Trousdale Construction Co., developer of a multipurpose project on the San Francisco Peninsula, planned for all utilities to be underground except in the industrial portion of the development. This multimillion-dollar development is on the lands of the old Mills Estate, located about 15 miles south of San Francisco, in the fast-growing peninsula area. It is a comprehensive development that will include industrial, commercial and professional areas, a group of garden apartments, schools, playgrounds and approximately 1,600 residences. The homes will be in the $22,000 to $23,000 class with approximately 1,500 sq ft of floor space. Each will have three bedrooms, two baths and will come equipped with built-in electric range and oven, dishwasher and garbage disposal. The two bathrooms will be heated with 1,000 w of ceiling-mounted heat lamps.

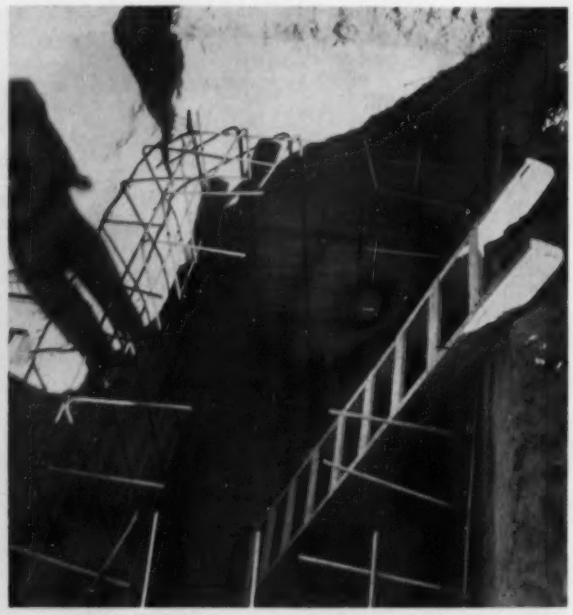
Most of the residential area is located on hilly ground which makes any sort of rear easement construction impractical from a standpoint both of installation and maintenance. It was therefore decided to keep all of the utilities in the street area. Aboveground structures for housing transformers, switches and other equipment were not considered advisable because of their appearance and the hazards involved in having them located in the street area. Use of trench-lay cables was also ruled out because of unfavorable chemical composition of the soil and the danger of damage to the cables by people or rodents digging, growing tree roots, etc.

Secondaries from adjacent transformers can easily be tied together in handholes of this type. They serve also for junction boxes. Handholes and covers are precast concrete

In view of the conditions it was decided to design a residential underground distribution system that would incorporate most of the refinements and operating advantages of a conventional underground system, such as would normally be used to supply a commercial area and still keep the costs within the bounds of a low-cost system. It was also necessary to integrate this system with that of the commercial area adjoining it.

Cost Was $396 Per Home

The result was the underground system described herein, built at a cost of $162 per kva for the entire devel-



Duct line (left) for power, telephone and electroliers showing manner of take-off. Right: No forms were used in pouring the manholes

opment as compared with an estimated cost of $67 per kva for overhead, a ratio of 2.43 to 1. In the residential tract the cost per home for complete underground — electric, telephone, street lighting and fire alarm — was $396. Thus for 1.75% of the selling price of a $22,500 home, the area will be supplied with a first-class underground system with no exposed structures, completely protected cables, back feeds for all transformers and easy accessibility for maintenance.

The general plan of serving the entire development is shown in the accompanying drawing. Commercial and professional areas and the garden apartments are to be supplied with four-wire 120/208-v wye from eight transformer banks, totaling 2,250 kva. The primary will be 12 kv, supplied from the utility's Millbrae substation. There will be three points of supply from the overhead into the underground system in this area. A specially designed 8x17x9-ft manhole will be used for transformers and switches. A completed manhole of this type is illustrated.

A 4x8-ft Transite barrier mounted at 45° across one corner of the manhole with a grated opening to the street above and an opening to the manhole proper at the lower end will provide an air shaft for ventilation. G & W rocker-arm type, three-way and four-way oil switches will be used for sectionalizing. An oil-filled single-pole switch of PG and E design, known as an ES-55, will be used for transformer cutouts. Secondary will be carried on wall-mounted buses in the manholes.

Costs will be cut greatly both in the commercial and residential areas by the use of joint duct lines carrying all utilities. Each duct run, as shown, will include Soapstone Oct-O-Duct for electric distribution, telephone, electrolier cables and fire alarm circuits. All of these ducts will be encased in a single concrete envelope. The ducts for the various utilities will be turned out of the main duct beam at the proper locations by means of hard-wall Transite ducts.

Radial 12-kv Primary

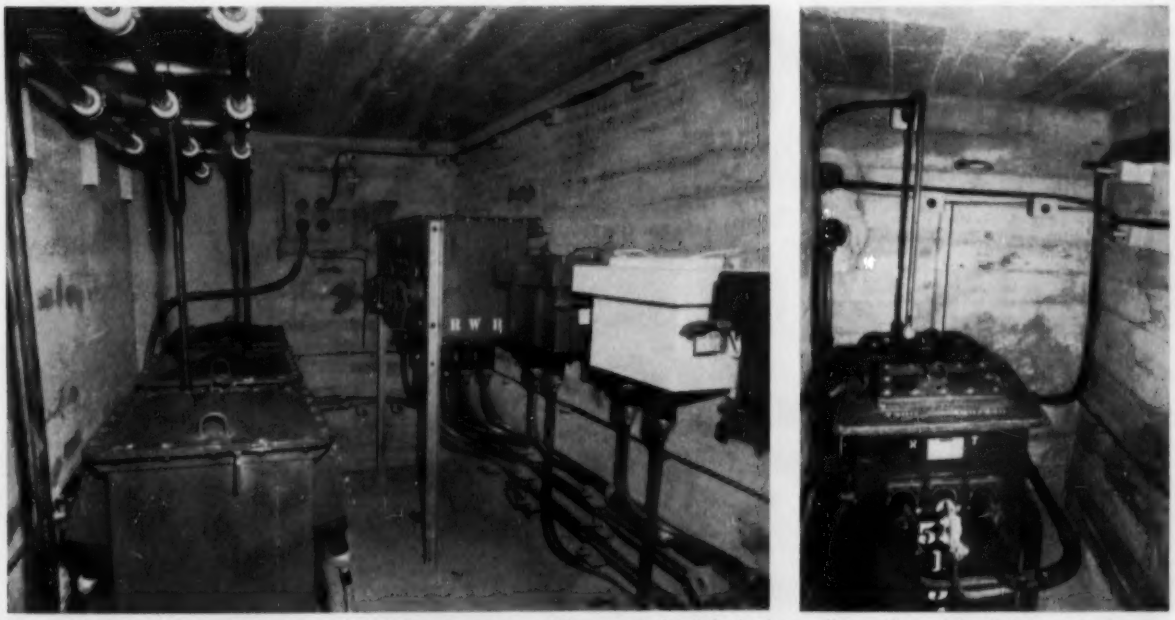
A single-phase radial 12-kv primary system will be used in the residential area with different phases supplying various sections of the area. There will be two main feed points from the overhead into the underground at widely separated locations. Use of 12-kv primary rather than 4 kv will increase transformer and switch costs but results in lower copper costs and will eliminate the need for a stepdown-unit substation.

The residential area will be supplied by 71 50-kva and two 100-kva, single-phase 6,900 to 120/240-v self-protected subway transformers. Use of 6,900-v transformers and single-phase primary will greatly cut the primary line switch costs and permit use of smaller manholes for switch installations.

The single-phase primary cables will have supply sources at each end, as shown by the diagram. An ES-55 line oil switch will be installed between each transformer so that any transformer may be taken off of the line and the secondary carried by adjacent transformers. Standard paper, and lead single-conductor No. 2 and 250 MCM cable with a polyethylene neutral will be used for the primary.

Secondary mains will be 1/0 RO&N (rubber insulated, ozone resistant, neoprene jacketed) in the residential area and 500 MCM in the commercial area. The secondary will be open between each transformer, thus eliminating the possibility of having transformers banked across an open primary switch. The system is designed with sufficient transformer capacity and proper spacing to insure satisfactory voltage and loading under these conditions. However, if future conditions should warrant the banking of transformers, the secondaries can be quickly closed at the desired locations. The secondary openings will be made by "clear capping" the cable ends in handholes, as shown, and racking them in such a way they can be closed with connectors. It is planned to use copper conductors throughout the development. However, the 4-in. Soapstone ducts will be large enough to permit the use of aluminum should the need arise.

Manholes in the residential area will be located in the sidewalk. These will be 4x8x6 ft with a standard 36-in. PG and E grated manhole cover or a 40-in. square grating. Ducts will enter the manholes only in the short walls, leaving the long walls free for the racking and splicing of cables. Transformer will be installed in one end of the hole and the ES-55 line oil switch in the other. One of these manholes is shown in one of the photo-



Two vault sizes were used. The one at left is for the commercial area; at the right is the smaller vault used for lighting transformers

graphs accompanying this article.

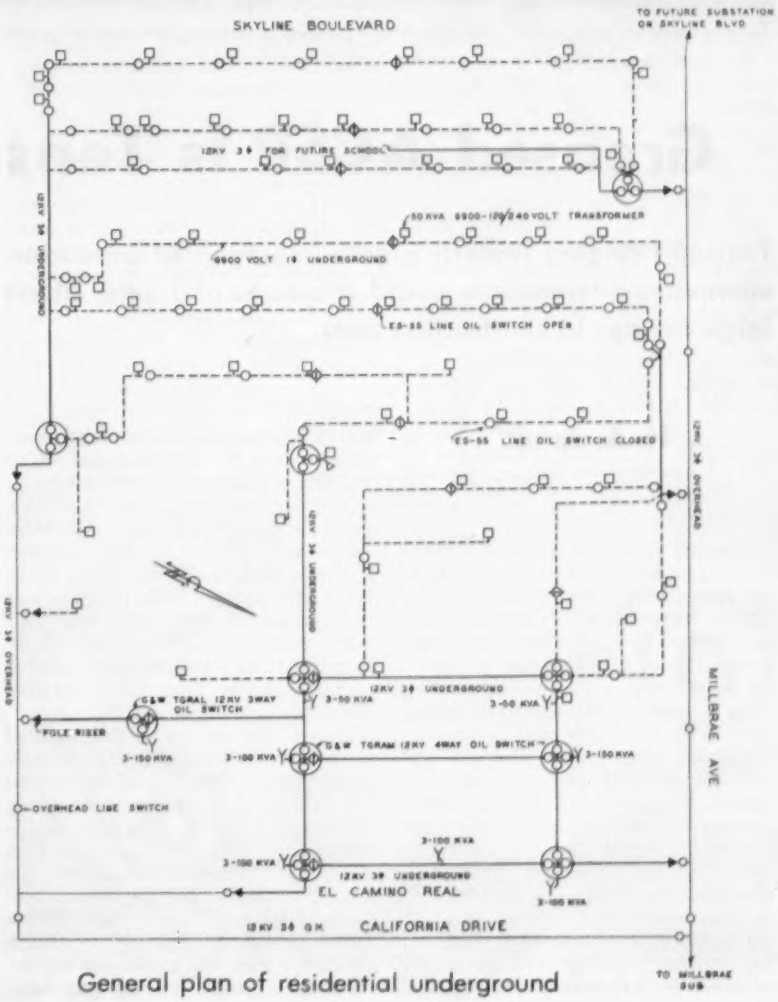
Ducts carrying secondary cables will enter 17x30-in. handholes located in the sidewalk at alternate property lines (see picture). Each handhole will supply service to two houses. There will also be a street crossing from each of these handholes to a 13x24-in. handhole on the opposite side of the street, which will also supply two houses. All of the secondary handholes will be of precast concrete with precast concrete covers. Primary cables will enter only the manholes, thus eliminating any possibility of unauthorized persons contacting high-voltage cables.

Estimated residential tract demand is 3,200 kw or 2 kw per house; installed residential transformer capacity will be 3,750 kva.

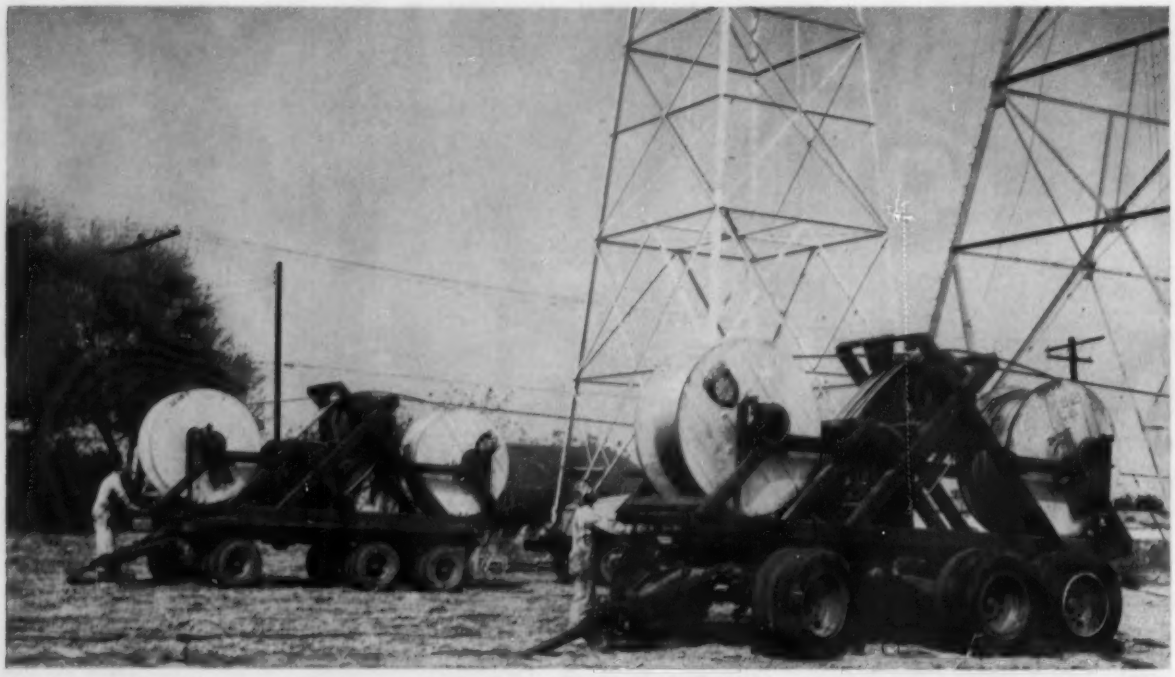
The tract developers will install all of the manholes, handholes and ducts, as well as the electrolier and fire alarm systems. In addition the developer will pay the PG and E the difference between the cost of installing underground equipment and the cost of a comparable overhead system.

The ducts and manholes used for electric distribution will be deeded to the PG and E.

Wilsey & Ham, civil engineers of Millbrae, Calif., are the engineers for the Trousdale Construction Co. Lowrie Paving Co. was contractor for duct lines and manholes. Ets-Hokin & Galvan, electrical contractor, installed the handholes and the complete electrolier and fire alarm systems. The author wishes to acknowledge the assistance of Harold Garner, San Francisco division, PG and E, in the preparation of this article.



General plan of residential underground



Tension machines with neoprene-lined grooves were used in stringing grease-impregnated ACSR conductor for 220-kv transmission line

Greased ACSR Is Tension Strung

Tension stringing protects grease-impregnated conductor; eliminates intermediate guard structures and nets; effects large savings in construction costs

H. A. Jandt

Assistant Chief Construction Engineer
Southern California Edison Co.

Use of grease-impregnated conductor and a tension stringing machine are noteworthy features of a 17-mile, 220-kv transmission line being built by the Bechtel Corp. for Southern California Edison Co. The line is located on the utility's right-of-way extending from Laguna Bell substation, via Lighthipe to La Fresa substation.

For 7½ miles between Laguna Bell and Lighthipe the line consists of a single circuit on 35 double-circuit towers. The remaining 9½ miles between Lighthipe and La Fresa is double circuit on 58 double-circuit towers. One ground wire only is being installed. A 1-in. water line to operate at 1,000 psi is being installed on each tower for insulator washing. Average height of towers is 72 ft, with average span of 900 ft. Average sag tension is approximately 8,200 lb, with some sections of the line pretensioned to 14,000 lb.

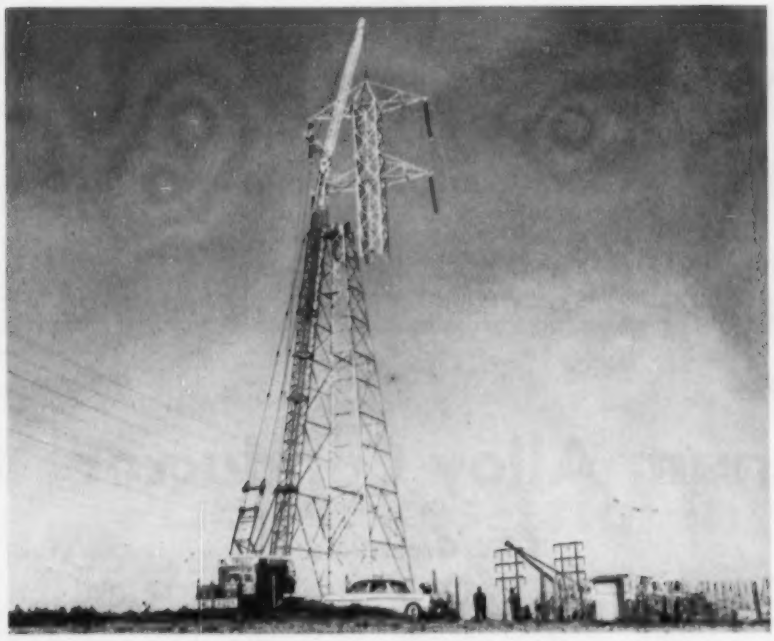
The line crosses numerous thoroughfares and side streets, one major freeway, three 220-kv lines of another utility, a considerable number of 66-kv lines and numerous distribution and communication lines. The line parallels energized 220-kv lines three-fourths of the way and then parallels energized 66-kv lines the remaining distance.

Tower steel was sorted and bundled at the steel mill and delivered directly to the proper sites. It was found that this scheme saved considerable time, effort and money as there are 10 different types of towers along the line. The towers were assembled on the ground in panels and then raised into position by one 45-ton crane with a 165-ft boom, the heaviest lift being about 4½ tons. On suspension towers, the entire upper section, complete with insulator strings, sag blocks and tag lines, was assembled on the ground and raised as one piece.

The conductor, manufactured by the Aluminum Co. of America, is 1,033,500 cir mil, ACSR 54 over 7, code Curlew, Calol-filled cable, furnished in approximately 3,850-ft reels. In the La Fresa-Lighthipe section the ground wire is ½-in., 7-strand, Calol-filled steel cable, furnished in approximately 3,850-ft reels. In the Lighthipe-Laguna Bell section the ground wire is ½-in., high-strength steel galvanized 7-strand cable, furnished in approximately 6,000-ft reels.

The Calol-filled conductor used was developed by Alcoa in conjunction with the transmission division of Southern California Edison Co. to combat corrosive action on the aluminum conductor by the salt-laden air and other contaminants found near the ocean. Calol white grease No. 2, made by the Standard Oil Co. of California, is a commercial grease approximating white petroleum jelly. A liberal coat of this grease is applied both to the steel and aluminum strands of the conductor during its manufacture.

Burndy Hypress splices are used for both the steel splice and the aluminum conductor splice. In making a



Forty-five-ton crane with 165-ft boom was used to erect entire upper section of towers

splice the proper cuts are made in the steel and the aluminum strands. The splice surfaces are cleaned with a wire brush and steel wool, and a coating of Calol grease is applied prior to the actual splicing. After the steel core splice is complete the aluminum splice sleeve is placed in position and filled through the plug with Calol grease by the use of a hand-operated grease gun, after which the splice is completed.

All hardware is attached to the conductor after it has been cleaned and a fresh coat of grease has been applied. A coat of grease is applied also to all hardware below the insulator string including Preformed armor rodding, after installation.

The Edison company previously has built two similar transmission lines, using greased aluminum conductor. These lines were strung using conventional reel dollies, on which the tension or braking was applied directly to the reel. Two difficulties had to be overcome in this type of slack stringing: (1) the dragging of the relatively soft aluminum conductor over objects on the ground, which would physically damage it; and (2) the tendency of the grease on the conductor readily to pick up sand and other possible contaminating materials.

Therefore, with this slack-tension type of stringing it was necessary to install intermediate guard structures, consisting of two vertical and one horizontal pole in the form of an H, on which the conductor rode between towers to keep it off the ground. These guard structures were in addition to netted structures over highways, transmission lines, etc. The cost of these additional guard structures came to about 9% of the stringing costs.

On the present job it was decided to use the Pengo tension wire stringer, as manufactured by the Petersen Engineering Co., Santa Clara, Calif. In this device the conductor pays off the reel through fair leads into the first groove on the first bull wheel, then over the first groove of the second bull wheel, back to the second groove of the first bull wheel, completing four wraps, until the conductor pays off the top of the highest bull wheel through fair leads to the first tower.

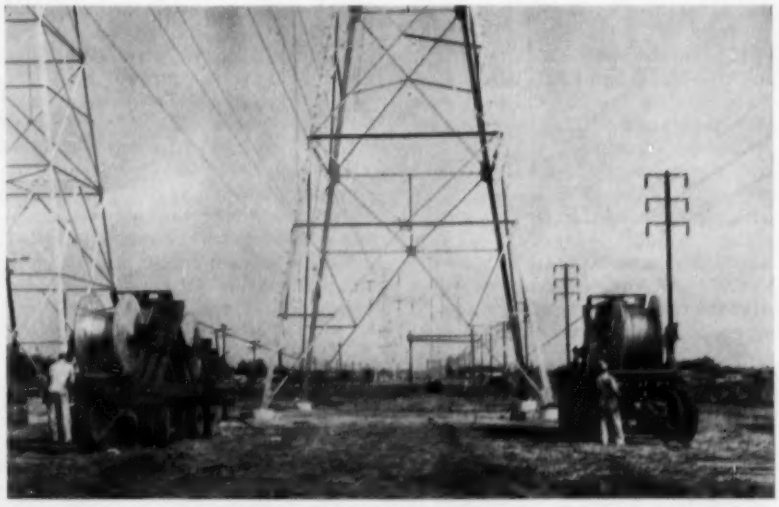
Except for very slight braking on the reel to prevent the conductor from becoming slack between the reel and the first wheel, all braking is done on the bull wheels. All brake controls are brought out at the end of the stringing device and manned by one operator. Bull wheel grooves are neoprene lined to protect the conductor from damage and prevent slippage.

By the use of this stringer, and depending on the length of pull, stringing is done at tensions varying from 3,500 to 7,000 lb. This keeps the conductor off the ground and eliminates the need for the intermediate guard structures. On a 3,850-ft reel, stringing time averages 21 minutes, which is considerable saving over the time required when using the reel dollies.

Operation of this machine is almost unbelievably smooth and, because the tensioning is done on the bull wheels rather than on the reels, conductor damage from the reels has been eliminated entirely. The only thing limiting the efficiency of the stringer is the length of the conductor on the reel. The greater the length, the higher the efficiency.

Edison has found that in partial tension stringing with the Pengo stringer and the aluminum conductor it is necessary to bring the conductor to its ultimate sag tension within 24 hours after stringing, because of the natural creep of the conductor if allowed to remain in the block longer than this period of time. Therefore, stringing and clipping in are accomplished on a rigid schedule.

The electricians operating this device are most enthusiastic about it as is everyone else concerned with this new transmission line, including the safety engineers. Upon completion of this project it is hoped that with the experience gained stringing time with the use of the new machine can be shortened considerably.



Stringing under tension obviated the necessity of installing expensive guard structures

Conductor Metal Properties (0.10 in. diameter wire)

	AAAC Alloy	EC Aluminum (Hard-Drawn)	Copper (Hard-Drawn)
Electrical conductivity, % IACS vol. (min. avg.)	53%	61	97
Ultimate tensile strength, psi. (min. avg.)	50,000	27,000	64,900
Yield tensile strength, psi	47,000	24,000	40,000
Elongation, per cent (in 10 in.)	1 to 6	1.5-2.5	1.0
Specific gravity	2.70	2.70	8.89

Properties of newly developed

All-Aluminum Alloy Conductor

E. W. Greenfield Supervisor, Electrical Engineering Section
Kaiser Aluminum & Chemical Corp.
Spokane, Wash.

A high-strength, good-conductivity aluminum alloy developed by the Kaiser Aluminum & Chemical Corp. appears to be ideally suited to the needs and requirements for tensioned aerial power or communication services. Four years ago research work was initiated to find a compositional range and thermal treatment whereby an all-aluminum alloy conductor could be made to meet the stringent requirements of loaded overhead transmission and distribution circuits.

Although the alloy has been fairly well established for several years, subsequent extensive fabrication experiments, evaluation research, accessory development and field tests have been under way continuously for the purpose of establishing a finished commercial product. At the present writing this program is in the final field testing stage.

The new conductor, designated AAAC (All-Aluminum Alloy Conductor), is composed of a heat-treatable magnesium-silicide alloy. Through proper heat treatment, cold reduction and thermal aging, wire is produced of exceptional mechanical strength yet with electrical conductivity only moderately reduced from that of pure, soft aluminum. Typical characteristics of the AAAC alloy in comparison with the common conductor grade EC aluminum and electrolytic copper are given in the accompanying table.

The product of *tensile strength* and *electrical conductivity* divided by *specific gravity* may be looked upon as a rough criterion of conductor metal efficiency in tensioned, overhead line construction. For the materials listed in the table these efficiency criterion factors are (assuming copper at 100%): copper 100%; hard-drawn EC aluminum 86%; AAAC 140%. Note that AAAC is almost twice as efficient as EC aluminum and almost 50% more efficient than hard-drawn copper. Comparing AAAC with the more popular composite aluminum and steel ACSR conductors on the same basis, one notes that the ACSR efficiency factors average about 115% —considerably better than copper but not as good as AAAC.

AAAC conductors have many advantages when compared with other types in overhead applications. Some of the most important of these are:

AAAC is as simple to splice and dead-end as all-aluminum or copper cables. A single compression sleeve only is required. Other suitable types such as bolted clamps, preformed rods and automatic splices can also develop the full strength of the conductor. This means less costly fittings than for ACSR, reduced installation time, more readily adapted hot stick work and much more rapid emergency repairs.

AAAC is designed in size steps to be approximately equivalent to ACSR conductors. This means a given standard ACSR size will have an equivalent AAAC conductor that has approximately the same outside diameter, d-c resistance and breaking strength. Many ACSR accessories will therefore be interchangeable.

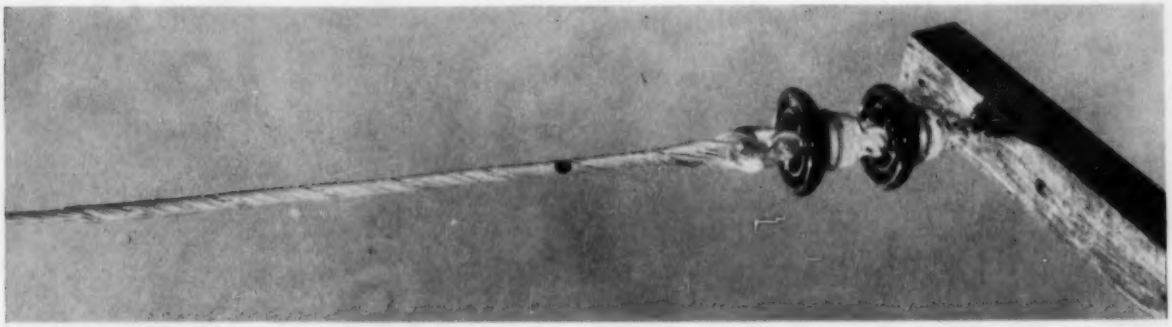
AAAC is homogeneous. Therefore galvanic corrosion that may sometimes occur between the steel core wires and adjacent aluminum strands in an ACSR conductor in severe environments cannot take place with AAAC. The balanced magnesium-silicide alloy used for AAAC has great inherent corrosion resistance in common with similar alloys and can be used in any natural environment.

AAAC has appreciably lower a-c resistance than equivalent ACSR. Containing no steel, the hysteresis and eddy current losses therein together with the sometimes large solenoid effect are absent. In 6 over 1 large ACSR conductor strandings the 60-cycle a-c to d-c resistance ratio can approach 1.25 or larger, with electrical loads near rated. For equivalent AAAC conductors the a-c to d-c ratio is substantially 1.0. Hence AAAC will operate cooler and with a cost-saving, lower watt loss per foot of conductor. Skin effect in AAAC is somewhat lower than for EC aluminum and of course is appreciably lower than for copper.

AAAC has about twice the Brinell hardness of hard-drawn EC aluminum. It will therefore not abrade so readily as either all-aluminum or ACSR conductors during installation nor will it wear to the same extent in ties, dead-end shoes and clamp throats.

Since AAAC is a heat-treated and stabilized alloy it will show less reduction in tensile strength after excessive heating than hard-drawn (cold-worked) aluminum or copper. In this respect it should behave comparable to the composite ACSR conductors.

AAAC is an improved version of very similar high-strength aluminum alloys that have been used for transmission and distribution circuits in Europe for the past 25 years or more. European records on these conductors shown an over-all excellent performance picture. It is believed that AAAC has a bright future in this country.



To accumulate field experience

PGE Makes Trial Installation

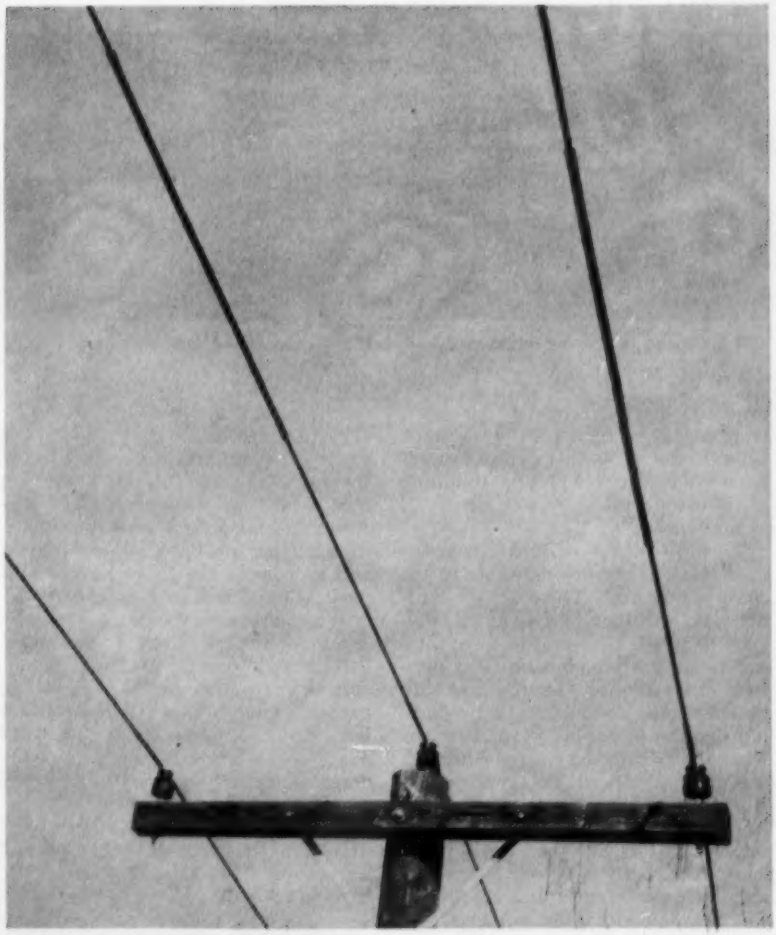
Alan D. Fragall Superintendent, Outside Divisions
Portland General Electric Co.
Portland, Ore.

An experimental installation of the new AAAC conductor, described by E. W. Greenfield in the preceding article, has been made by Portland General Electric Co. in a rough weather area. It felt that the new all-aluminum alloy conductor may provide a better answer to several problems in the use of the light metal.

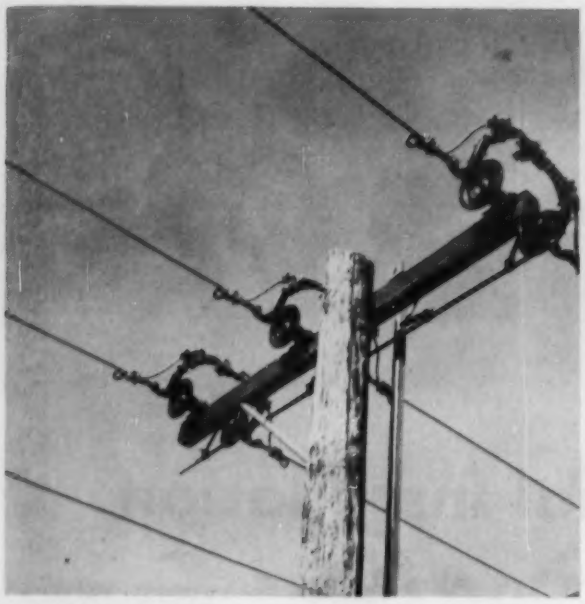
Ease in development of full mechanical strength and the possibility of using hot sticks as simply as with copper are the two greatest features of this wire so far as construction is concerned. A little more than two miles of 4/0 three-phase 12.5-kv line have been installed as an experiment to test some of its qualities.

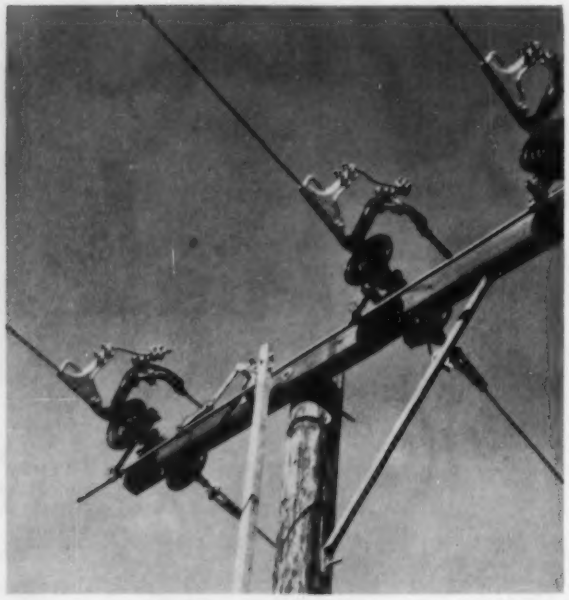
Most of the area served by Portland General Electric Co. is blessed by mild climate and is in the medium loading classification of the NES Code. However, a small segment in the northeast corner receives the full fury of the strong east winds which sweep down the Columbia Gorge at freezing temperatures and meet rains coming in from the Pacific Ocean on the West. Under these conditions a solid formation of ice with one inch or greater radial thickness is a common occurrence. About one-half of the test line is at right angles to this wind and the other half is approximately in line.

Although vibration fatigue laboratory tests indicate the new wire is equal or better than conductors used in the past, it is felt that actual field tests in an area where conditions are severe will serve to clear some of the reservations the utility has on this factor. In this experiment the conductor is being tied directly to the



To accumulate field experience test installations included use of Preformed splices in two phases, Preformed line guards at insulators and Preformed dead-ends (top of page)





At left is shown the Burndy straight line dead-end at a KPF switch location. At right: the Bethea distribution-type dead-end was used

Saw cut shows no fraying out even though nothing was used around wire before cutting

insulator on some poles. On others it is being protected by Preformed Line Products Co. line guards. Vibrations will be checked and the condition of the conductors carefully examined as time passes.

Two properties of this conductor tend to make it very desirable to the construction man. These are its hardness and the fact that it is a homogeneous alloy. Because of its hardness it does not have to be handled as carefully in installation as is the case with the EC grade conductor. Its hardness reduces the possibility of nicking the wire when it is being strung. Although it is quite springy the line crew reports it is not more difficult to handle than ACSR. In addition, the hardness may solve much of the "cold flow" problem experienced with the softer aluminum. Some clamps and connectors will be installed for test purposes.

Because of its homogeneous nature the problem of developing full mechanical strength in splices and dead-ends is greatly reduced. It will also be a boon to crews who have to work it with hot sticks. This is no small factor because about 85% of PGE's service area is now 12.5-kv-wye primary construction and soon all except service in the cities of Portland and Salem will be converted. Crews have developed a lot of skill in handling ACSR hot but there is no doubt that the elimination of the steel core would make many operations much easier. It takes time and special tools to cut back the aluminum and install a steel sleeve for compression splicing, also dead-ending hot requires a large bolt-type arrangement.

A complete line of fittings for working the new conductor has not yet been developed but no doubt automatic sleeves and automatic dead-ends will be made available. This will put construction efforts on a par with those used for many years with copper.

Preformed armor rod splices were used in the experimental installation. Pull tests and simultaneous resistance measurements made in the PGE laboratory showed satisfactory mechanical and electrical performance up to full strength. Electrical resistance remained satisfactory after the tension had been entirely removed. Different types of dead-ends were used after proving the test. Three are being used in this experimental line: Bethea DA 22; Preformed dead-end; and Burndy CVW 31 A-E straight-line type.

In all probability the price of the new conductor will be competitive, especially when consideration is given to the installation labor cost. Also, a-c resistance and power losses are reduced when compared with ACSR. These factors combine very favorably for the new alloy.

Although the area served by Portland General Electric has good atmospheric conditions, the elimination of the steel core will probably solve corrosion problems in some locations.

In all, it appears many features of this wire may be exploited to advantage for various reasons which may differ in different sections of the country. It seems to be ideally suited for distribution primary circuits — especially if hot stick work is required. And it should work out very well on long-span secondary with crossarm-type construction. Also tests will be made using it as a combination neutral-messenger for field spun aerial secondary cable. Portland General Electric Co. welcomed the opportunity to try the new conductor in the Northwest. Time in the field will give the final answer.

Desert trailer court provides de luxe facilities for travelers. Right: All utility services are provided from these concrete boxes

An example of low-cost

Trailer Court Underground

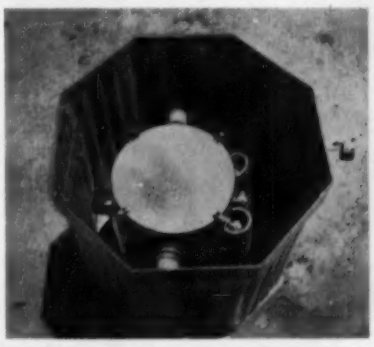
Electrical facilities for the "million dollar" trailer court being built by Bing Crosby and associates near Palm Springs, Calif., are in keeping with the de luxe character of the whole project. All wires, from the utility's primary cable to trailer services, are underground. The accompanying staff photographs show features of the electrical installation. In addition to parking facilities for trailers, the project includes a large community social hall, swimming pool and a shopping center.

California Electric Power Co.'s 4.8-kv primary cable comes in underground to a walled concrete block substation which is surrounded by shrubbery. There is no roof and one end of the enclosure is provided with a chain link door. The entrance is effectively concealed with a picket fence. Primary and secondary feeders emanate from this load center.

A three-phase, 4.8-kv primary feeder serves the transformers in the trailer area. This feeder consists of three single-conductor, 5-kv shielded No. 6 ORS insulated cables run in 3-in. Transite duct. Electric, telephone, gas, water and sewer facilities are located in a common trench enclosed in a concrete envelope. An accompanying photograph shows one of the precast secondary junction boxes used and the precast octagonal bases on which the transformers are placed. The latter serves both as a junction box and as foundation for the transformer.

Transformers are enclosed by a corrugated galvanized sheet metal can with padlocked cover, as shown. These are fabricated locally and are of the type that have proved successful and economical in the utility's residential underground in Palm Springs. Transformers up to 50 kva are accommodated; secondary runs are direct burial cable, No. 4 neoprene insulated.

Combined transformer base, junction box



Locally fabricated transformer enclosure

A paving slab is provided for each trailer. Alongside this is a concrete box as shown, for all services required by the trailer. Sewer connection is adjacent. Carl A. Barrett, engineering estimator for California Electric Power Co. at Palm Springs, is responsible for the design of this service box.

Each trailer has a laundry, shower and utility room. The service run for trailers terminates here with main line switch and branch circuits for the trailer and laundry equipment. Many of the trailers have refrigerated air conditioning equipment with single-phase motors up to 5 hp in size, in addition to other electrical load. Some trailers have a car port and built-on living room providing "all the comforts of home."

Space is provided for 100 trailers with room for expansion. Cost of the electrical underground system in the trailer area was $3.50 per trench-foot. Design of this low-cost residential-type underground can be credited to C. B. Anderson, underground engineer for California Electric Power Co.

Installation was made under contract by McLaughlin Electric Co. of Palm Springs, Don B. Zehner, superintendent.

Set-up made viewing easy; integrated color and light was pleasing. Atoms at Work and electronic displays were in the auditorium

Modern Living Show Attracts

A toaster, familiar appliance to most, was used as demonstrator in bureau's AW display

At show opening and inaugural of new lighting: Manager LeRoy Bennett; Oakland's Mayor Rishell; Douglas Aiken, PG and E; Norris Nash, Chamber of Commerce president

That its diamond-pattern layout was liked by exhibitors and some 70,000 spectators; that harmonizing color and light in the decorations and in the exhibits themselves helped put people in a buying mood was established beyond doubt before the nine-day Bay Area Exposition of Modern Living at Oakland drew to a close Oct. 9.

The show, which was sponsored by the Northern California Electrical Bureau and the Gas Appliance Society of Northern California, was a success saleswise and financially, according to LeRoy H. Bennett, its manager.

Although attendance was not as high as had been expected, the type of person who came was way above average, Bennett said. The people were in a position to buy and they were buying —particularly high-ticket items. The only exceptions were where retailers failed to staff exhibits put in by wholesalers.

Greatest interest was in complete kitchens and a number of them were sold on the spot. Housewares people did very well and so did the "do it yourself" and the power tool exhibitors. Music items went well too. "It all depended upon how hard they tried," Bennett commented.

There was no delay about financing because American Trust Co. and Bank of America were set up to handle contracts right on the exposition floor.

Occupying the center of the auditorium was the Atoms at Work display sponsored by Pacific Gas and Electric Co. Described as the most comprehensive exhibit of its kind ever assembled,

In the Exposition Building were appliances, housewares, lighting and allied exhibits

Exterior floodlighting invited attendance

Buyers

the complete working demonstration from the Oak Ridge Atomic Energy Museum was augmented by General Electric and Westinghouse reactors and a model atomic power plant display by Allis-Chalmers, another by Bechtel Corp. A model of the Navy's Nautilus, the world's first nuclear-propelled underwater vessel, was provided by General Dynamics Corp. Trained technicians were on hand to demonstrate all the models and to answer questions.

Although the atomic exhibit was too vast in scope to be fully appreciated by the casual visitor without a guide, it was an outstanding success educationally. Oakland required all public school science classes to see it and parochial school attendance was high. Student groups came from all over the Bay area and from down the Peninsula; were guided through the exhibit by John Fox, educational director of the Oak Ridge Museum. One of the most appreciative was the blind student group, it was reported.

The puppet Fairyland theater (which had its first public showing; was to be moved to the children's playground back of the auditorium) was a big drawing card. Other entertainment was not provided because high-priced talent at home shows has not paid off in this area.

Seventy thousand square feet of the Oakland Auditorium, Theater and Exposition Building were used during the show. Predesigned by decorators and color consultants to hew to a general decor, the entire exposition presented one striking display. Pastel colors and studied lighting arrangements were expertly integrated.

Exterior too contributed to the pleasing whole. The huge auditorium porticoes facing Lake Merritt were used as the main entrance. Floodlights, presented to the city by Pacific Gas and Electric Co. and the show's sponsors, bathed the archway openings with colored light.

Exhibitors paid for their own display booths and were permitted to take them away if they wanted to keep them. More than 80% elected to do so, Bennett said.

Questionnaires returned to the show management showed that more than 90% (100% in the Exposition Building) favored the stylized exhibit structure. Sixty per cent favored the diamond pattern. Pockets developed in this first use of the arrangement could be corrected in another show, Bennett said.

From the spectator's standpoint, the diamond arrangement was ideal. So was the fact that the large space was not too crowded. Those who paid their money to get in could really see the exhibits and they came away less fatigued than from many an exposition. Brightness and color also contributed to enjoyment and lack of tension.

Every piece of built-in equipment (including G-E's new four-appliance kitchen center at $1,650) was stopping the crowds. Some manufacturers reported that stainless steel and copper were pulling harder than color. Another display that stopped people—and long enough to hear the story—were the adequate wiring displays of the bureau and two of the exhibitors.

"Be Kind" Theme To Sell Dryers

"Be kind to yourself and to your clothes" is the theme of a special electric clothes dryer sales campaign being conducted by Los Angeles Department of Water & Power and the Electric League from Nov. 1 through Feb. 29.

To stimulate buying during that period the Board of Water & Power Commissioners has authorized a $15 contribution toward the wiring installation cost. To be eligible for this wiring allowance a dryer purchased during the four-month campaign must be installed in a new home prior to June 30, 1956.

Newspaper advertising supporting the drive will be supplemented by bus and streetcar cards, TV spots, direct mail and promotional material for appliance dealers.

The department's 25 appliance display locations will feature electric dryers and demonstrations of laundry equipment by the home economics staff will be increased during the drive.

Pointing out that nationally the preferred type of clothes dryer has been electric, three to one, Garson Ray, supervisor of market development for the department, said that the local campaign would benefit from strong national promotions. As one of the three top automatic washer markets in the country, Los Angeles is expected to attain a high public acceptance of electric clothes dryers, he stated.

When Edison company home economists met for a two-day intensive training program . . .

Servicemen were brought in for a panel discussion. With J. C. Meserve as moderator, Harry Johnson, S. W. Kinka, Eve Conant and Pauline Eliker examined the question . . .

Is the Story the Same?

Believing that both utility and customer would benefit if home economists and servicemen could talk over their common problems, Southern California Edison Co. decided to give them that opportunity. It brought the servicemen into its recent home service training program for a panel discussion: "Are the Servicemen and Home Economists Telling the Same Story to Our Customers?"

The two-day home service workshop was planned and conducted by Pauline Eliker, Edison home economics coordinator. Starting with a talk by J. C. Meserve, manager of residential sales, "The Part the Home Economist Plays in Our Edison Company Sales Program," the first day's training took up the company's public school activity and covered the new things in appliances, methods and products. The second day was devoted to the Edison Electric Living Center program; had the servicemen's panel as a luncheon feature.

Service of Edison home economists varies with requirements of the different districts, Miss Eliker explained, but the broad outline includes: (1) home calls; (2) classroom demonstration for homemaking students in the public schools; (3) Electric Living Center demonstrations for adult and youth groups, dealer salesmen and company employees; (4) "Chef" parties for real estate salesmen; (5) hostessing electric tract model home showings.

On the panel were Pauline Eliker and two home economists, Eve Conant, Santa Monica, and Norma Coret, Santa Ana, Harry Johnson, supervisor of appliance service, and two servicemen, Luke Jennings, Visalia, and Steve Kinka, Huntington Park. J. C. Meserve was moderator.

Following a statement of policy by both home economists and servicemen, each group asked a series of questions. To bring out the points that needed clarification and to insure that each group got the information it wanted, the questions were prepared in advance and given to specific persons to answer. Aim was to get a better coordinated program in which there would be no chance of confusing the customer with conflicting information.

Home economists wanted to know what the servicemen were telling the customers about cleaning the oven, using aluminum foil under surface units, soap and detergents for automatic washers. They were interested in the cost of reflector pans, of replacing surface units and deep well pails. They asked about the type of service, what appliances would be serviced, whether an automatic unit could be installed in an older range.

Servicemen wanted to know the extent of home calls, how service requests were relayed, how oven temperatures were checked, how to obtain assistance for a customer from a home economist.

When the discussion was over participants believed that they had gone a long way toward their objective: better coordination through better understanding.

Here are a few typical questions and answers

Q—Why don't the servicemen check the electric ranges in the public schools at the start of each school year, without a written request?

A—We prefer checking ranges when someone is around and can point out what needs servicing. A service order is better.

Q—Do home economists go out on all dealer sales?

A—We go out on all electric range calls where our service is requested for a care and use demonstration.

Q—We would like to ask that the home economists give more information on trouble calls. A written note on the exact nature of the complaint or problem will assist the servicemen in prompt and fast service. Could this be done?

A—Yes and it should be done.

Q—We know some of the home economists are checking oven temperatures with thermometers. Is this necessary?

A—No, it is not necessary and home economists do not carry the proper equipment or have the proper training for this job. The servicemen should check the ovens and the home economists bake the cakes.

Q—Would it be possible for servicemen to obtain information from the home economists on the operation of the new electric ranges each year?

A—Yes, special training schools are held at the beginning of each year for the home economists where the new ranges are demonstrated and all new features explained. The servicemen are welcome to sit in at this school.

ELECTRICAL WEST Sales Guide

News Letter

November 1955

FOR THE ELECTRICAL MERCHANT OF THE WEST

When modern equipment doesn't operate efficiently more often than not it is because it is not being used properly. One of the ways the American Home Laundry Manufacturers' Assn. tries to get knowledge of laundry techniques to the consumer is by informing home economists, educators, extension workers and others who meet the public. As this issue went to press AHLMA was holding its ninth annual conference in San Francisco, first of these meetings to be held west of Chicago. Latest techniques in washing, drying and ironing clothes and new developments in the mechanics of the appliances themselves were being presented to an audience of about 400. Speakers were top flight and their statements were backed up by hours of research in the laboratory and in the laundry. The exhibit held in connection with this meeting included 60 late models, some of them in the 1956 lines. While mechanical developments and added conveniences were impressive, it was also apparent that in appearance home laundry equipment need not take a back seat to any appliance. Details of the meeting will be published in Electrical West next month.

Don't blame the washer

An electric refrigerator with a 40-lb vertical freezer space, an adjustable vertical electric broiler and a 3/4-ton room air conditioner that can be plugged into a standard 110-v circuit were among the products introduced by Gibson at its College of Sales Knowledge, national distributor meeting in Las Vegas last month. Some 500 distributor executives and 200 distributor salesmen attended this first meeting in the West; heard Gibson Vice-president W. C. Conley speak out for the independents. Trends in the major appliance industry are forcing distributors and dealers to choose between full-line producers and independents who believe in producing what they are best at, he said. "The full-line operation forces the distributor to go in the opposite direction from what American business is finding to be good policy--diversification," he continued. "The only way a distributor can follow this policy of diversification today is to line up with several independent producers rather than becoming dependent on one." He said Gibson would sell products on their merits with no tie-ins required, no mandatory purchases and a policy of free competitive operation.

One for the independents

An oven that cooks with radio waves is offered for home use by Tappan at suggested list of $1,000. It looks like a conventional built-in oven; operates on 220 v; needs only high and low speed controls; will cook bacon in two minutes, a 5-lb roast in 30. Because the oven transmits microwaves, FCC has assigned a wave length of 2,400 mc for cooking. Tappan worked with Raytheon, who has commercial unit.

Electronic oven

Whirlpool-Seeger, whose President Elisha Gray was in the West last month, will have a completely new line of home freezers ready for national distribution in January; will market it under the RCA-Whirlpool brand name. Recent purchase of International Harvester's refrigeration division with plant and facilities in Evansville, Ind., put the schedule ahead about a year, it was announced. New sales setup of the merged companies includes these in the Western region: Peter Prussing as regional manager; Frederick C. Stevenson, Los Angeles district manager; Thomas C. Streight (RCA), Seattle district manager.

New line

Sunbeam Power Drive dealer dinners are introducing new products and models, telling of company sales helps available during the coming months. In northern California the dinners are to continue through November. Typical was the Oct. 18 meeting in San Francisco where John Sandoval and his assistants presented the new power tools and the blender attachment in addition to the rest of the line; gave tips on how to sell each item. Ernie Lee, who heads the Shaver Division in this area, showed the new Lady Sunbeam; pointed out that box top and other premium offers were a form of discount selling, meant by-passing dealer and distributor. A movie showing the company's promotion plans concluded the program.

Power drive

Last month, after one year under its Fair Trade program, Sues, Young & Brown, Los Angeles distributor, reported progress. Business volume nose-dived initially, Vice-president C. P. Culbert said, but soon rallied; at the end of the first year showed a 60% increase over comparable months of 1954.

Fair Trade pays

American Standard for Testing and Rating Home Freezers, B38.3-1955, will be available from the American Standards Assn., 70 E. 45th St., New York 17, at 40¢ per copy. A cross section of the industry, consumers and representatives of the Department of Agriculture helped in developing this standard.

Freezer standards

The Electrical Women's Round Table named its newly established graduate fellowship in honor of Julia Kiene, who retired Sept. 30 as director of the Westinghouse Home Economics Institute, is opening her own consulting service in Mansfield. Well known in the West, where she has been a frequent visitor and conference speaker, Mrs. Kiene was on the program for AHLMA's San Francisco meeting early this month. The fellowship will consist of a $1,000 annual grant for study toward a master's degree in home economics with concentration on household equipment. Western chapters of the Electrical Women's Round Table and their chairmen are: Puget Sound, Velma Seat, Sunset Electric, Seattle; Rocky Mountain, Elizabeth Anderson, Larson Distributing Co., Denver; Oregon, Sally Hibbs, Marshall Wells, Portland; San Diego, Phyllis M. Smith, Good & Range Testing. Alice Hazeltine, Kenworth Motors, Seattle, is a member of the national executive board.

Round table fellowship

Three Westerners were named to the board of governors of the International Association of Electrical Leagues at the recent Toronto conference. G. L. Logan, Electric League of Los Angeles, is treasurer. On the board are: R. B. Hubbard, Rocky Mountain Electrical League, Denver; W. H. Johnson Jr., Appliance Merchandisers Assn., Phoenix.

On board

San Diego Bureau of Home Appliances received the NEMA top award for promotion of electrical gifts during the year ending July 1. Presentation was made at the recent IAEL conference in Toronto last month by NEMA's Electrical Housewares Section. Bureau Manager Clark Chamberlain was present to receive the bronze plaque.

Top award to San Diego

When Hilo put on its recent freezer school, homemakers were reminded a week in advance by a 12-page section in the Hilo Tribune-Herald. Prepared by Hilo Electric in cooperation with the newspaper, the special section contained information on the freezer and its use, recipes and tips. Actual experiences of Hilo housewives added human interest and a cover showing four happy children in front of a well-stocked freezer was a sure stopper. It was suggested on the cover that Freezer Facts be saved for reference. The school was sponsored by Hilo Electric Appliance Dealers Assn. and the Tribune-Herald. Helen Brown and Doris Crow, Hawaiian Electric home economists, conducted it.

Freezer facts

For the rest of 1955 Portland General Electric will finance for its customers new electric water heaters with all necessary wiring and plumbing. Purchases are made through appliance dealers or plumbing or electrical contractors; the customers puts nothing down, may take three years to pay. Offer applies to any make or model so long as it is 40 gal or more in capacity and has a minimum of 4,000 w.

Financing water heaters

Aimed at replacing obsolete electric as well as gas and other flame-type ranges, Washington Water Power has started an active sales campaign for Spokane apartment houses. The utility has secured from a manufacturer a fully automatic range to be sold and installed, exclusive of wiring, for $71. Quota is 600 before the end of 1955.

Ranges for apartments

PG and E will spearhead November's dryer campaign with bill inserts, truck banners, outdoor posterboards, newspaper ads and office displays. Utility representatives are working with dealer groups to develop local campaigns.

All out for dryers

Average kwh consumption by residential customers of California-Pacific Utilities Co. has increased nearly 8% over last year. Estimates are that average use per domestic customer will exceed 5,500 kwh annually.

Use up

With appliance sales in Arizona Public Service territory up 13% in dollar volume as compared with the first nine months of 1954, it is predicted that appliance dealers will wind up with the best sales year yet--surpassing the record of 1953. More than 900 frypans were sold during the recent campaign. Automatic electric ranges and electric water heaters will be promoted next.

May be best yet

Mountain View Electric Assn. held an electric show in connection with its annual meeting at Limon, Colo., last month. On each of two nights one major electrical appliance and several smaller prizes were awarded following a variety show. Winners got their choice of several makes on display.

Prizorama

R. F. MacGillivray has been made manager of Westinghouse major appliances for the southern California district, with headquarters in Los Angeles. He is being replaced in San Francisco by M. V. Musy, who takes over the northern California district. MacGillivray succeeds Robert J. Moore, who has been transferred to the air conditioning division in Staunton, Va. . . Shirley Huntsman has been made domestic appliance department superintendent for Public Service of Colorado succeeding Ed Rowland who retired from the company after 45 years of service. . . Ford C. McElligott, who has been operating his own advertising agency, was appointed to a newly created post of merchandising manager by Sues, Young & Brown of Los Angeles. . . Paul E. Bryant has been promoted to general sales manager of Hoffman's Radio Division. . . W. L. Nylen Sr., Honolulu dealer, was honored by former employees on completion of 35 years in merchandising.

About people

Emerson has added tape recorders to its line and is making available Vigorelli sewing machines to its distributors and dealers. . . Packard-Bell has made its service operation a division and put Carl A. Duffy, newly elected vice-president, in charge. . . Hoffman is now concentrating its color TV manufacturing at the Pasadena plant, black and white at Los Angeles. John Greenwell is Pasadena plant manager and Paul Kliment is chief color engineer. . . Motorola has put a lower price ticket of $695 on its color TV receiver. . . Move in black and white seems to be toward slightly higher prices to take care of increased materials cost. . . Magnavox started its color TV service training program in San Francisco, where it held a five-day session last month for its dealer technicians in the 11 Western states. Enrolling is limited, each student must pass an entrance exam in black and white TV, receives his training without cost to himself.

About manufacturers

G-E has announced a training program in sales methods and business practices to take advantage of the healthy market for major appliances expected soon after the first of the year. Distributor sales counselors will take an intensive one-week course and return to the field to pass on the information to retail salesmen. Courses for Western counselors will be held in San Francisco, where the program is in charge of Claude Tindle, who formerly conducted sales training programs for G-E Appliances Co.

Training program

Hoover has bought a controlling interest in Phebco Inc., Baltimore electronics firm. . . Thor has sold its Cicero and Bloomington plants, the former to Danly Machine Specialties, the latter to Eureka Williams Division. These plants were used for manufacture of washer and ironers and Thor several months ago contracted with Avco for production of its new automatic washer, announced it was expanding into fields outside the home appliance industry.

Purchases and sales

Thomson-Diggs will consolidate its independent major appliance division into its old-line hardware division; is liquidating its appliance headquarters at San Francisco and will restrict coverage to the Sacramento area. Reason for the move: "the law of diminishing returns in major appliances."

Consolidation

John Bonnet has been made dealer development representative in Los Angeles for Universal Electric Housewares Division. . . William P. Harrison, formerly of Sues, Young & Brown, Los Angeles, is now manager of the traffic appliance and housewares division of Horn & Cox, Los Angeles.

New jobs

Gregnall Co. of San Francisco has been made full-line distributor for Capehart-Farnsworth. Gregnall headquarters are in Space 431, Merchandise Mart. John B. Gregory is president; Max Hoseit, vice-president and sales manager. . . Horn & Cox of Los Angeles has been appointed distributor for Servel appliances in southern California. Headquarters are at 4382 E. Bandini Blvd. . . Love Electric Co. has been made Washington distributor for Philco TV, radio and appliances. James B. Love is president of the company, which is now in a new location at 500 Westlake N. Founded in 1898, the firm is Northwest distributor for Columbia records and phonographs, the A. O. Smith water heater line. Wayne M. Kuykendall is general manager.

New distributors

Admiral Corp. has completed an experimental model of a transistor radio that derives its power from the sun, requires no tubes or replaceable batteries, conceivably could last a lifetime without repair. The solar receiver resembles a conventional table radio, contains volume and station selector knobs and loudspeaker.

Solar radio

Idaho Power Co. is Sponsoring

Water Heater Replacement Drive

A three-way cooperative program designed to replace inoperative electric water heaters with complete new installations has been put into effect by Idaho Power Co. The utility, electrical dealers and plumbers are participating in the program, which applies to the replacement market of residential and farm customers only.

In formulating the plan Idaho Power had a dual purpose, A. S. Gilbert, sales manager, said. It wanted to maintain customer use of electricity for water heating and to let everyone know that the electrical water heater is responsible for the bargain step in its residential rate.

In addition to sustained advertising, the company will pay a $12 bonus to electrical dealers and plumbers for each water heater replacement in the residential and farm classification. The installation must meet the water heater specifications contained in the company's residential rate schedule No. 1.

The utility is counting on dealers and plumbers to work with its own sales personnel toward the goal and it will take these steps to carry out its coordinated program:

1. Encourage all water heater customers to call Idaho Power direct in case of water heater failure. Objective is to tell every customer its water heating story and the effect on rates.

2. Place small signs on all water heaters urging customers to call the nearest company office if heaters fail.

3. Urge all company contact people to sell the advantages and benefits of calling Idaho Power first if a water heater fails.

4. Further sell this plan through newspapers, radio, TV, bill stuffers, telephone directory.

5. Turn over to the dealer or plumber of the customer's choice all requests for water heating service.

6. Assist the dealer or plumber in every way possible to complete the sale. Every residential and farm representative will take part in the program.

7. Make every effort to get the dealer or plumber and the customer together when necessary. It will even transport customers to and from dealer or plumber stores.

8. Ask dealers and plumbers to agree to cooperate by notifying the company immediately upon receiving a customer request for water heating service. This is to give the company an opportunity to see the customer and tell its water heating story.

Customer Benefits

Under the plan residential and farm customers can save on service costs in water heater replacement if they will notify the company immediately when there is a failure.

The utility will give this service free: (1) inspect water heater and advise on repair or replacement; (2) if replacement is needed, will handle complete transaction with dealer or plumber of customer's choice; (3) will disconnect wiring on old water heater and reconnect new installation if additional wiring is not required; (4) will make available water heating engineering service to customer, dealer and plumber, insuring the most efficient type of installation; (5) will adjust thermostats for proper temperature (on replacement of heater or thermostats will charge for parts only).

If a major rewiring job is needed, the customer can finance labor and materials through Idaho Power's financing plan. The company will aid also in financing water heater replacement sales where the dealer or plumber is unable to provide deferred payment contracts and will guarantee financing of wiring and heater up to $200. Form 835 for residential electric wiring is prepared by the dealer and forwarded to the company for approval.

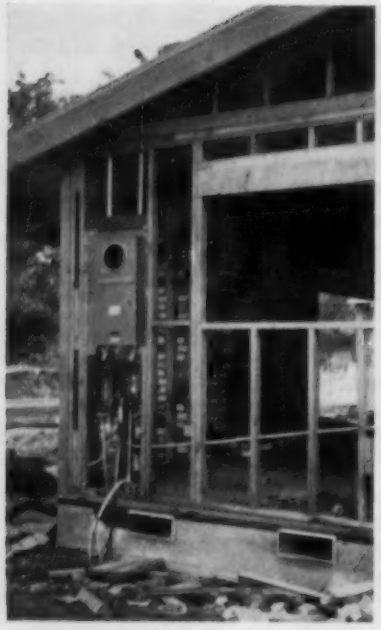
Dealer Advantages

In addition to the $12 bonus, the plan presents other dealer advantages. Sales work is largely taken care of by Idaho Power representatives and the sustained company promotion includes all effective media. The company will follow up to keep the customer sold. The dealer has no electrical connect or disconnect problem, and will not need to make special trips to customer premises to determine cause of failure.

LEFT on CHATSWORTH to Havenhurst
the house of the year for years to come
Rosemont Estates
ELECTRIC KITCHEN
BUILT-IN in COLORS
FIRST TIME in the Valley
4 bdrms 3 c Den
3 bdrms and 2 baths
finest terms VETS-NON VETS
WITH LOW COST Electricity
YOUR CITY OWNED DEPARTMENT OF WATER AND POWER

Illuminated Signs Help Sell Homes

Illuminated signs like these of the Los Angeles Department of Water & Power are helping builders sell tract homes. In addition they are promoting electric living and adequate wiring. One builder sold out his tract immediately with the department signs; says he is going to put the same type wiring in all his tract developments from now on



Roughed-in dual service, meter can, panels

Circuits take off from the bottom panel cabinet, shown here from the inside, framed in

How They Wire Homes for Dual

200-Amp Power Panel Circuits
All 2-pole 120/240-v breakers

		Approx.
1	70 or 100 amp—Up to 6½-hp heat pump	16,800 w
1	20 amp—Built-in oven	3,200 w
2	30 amp—2-element built-in range tops	6,950 w
1	30 amp—Clothes dryer	4,500 w
1	40 amp—Workshop (sub feed)	2,000 w
1	40 amp—Swimming pool patio (sub feed)	2,000 w
1	30 amp—Water heater	6,000 w
		41,450 w

$$\frac{41{,}450 \text{ w}}{240 \text{ v}} = 173 \text{ amp}$$

2-pole spare (not counted)

100-Amp General Purpose Panel Circuits
All single-pole 120-v breakers

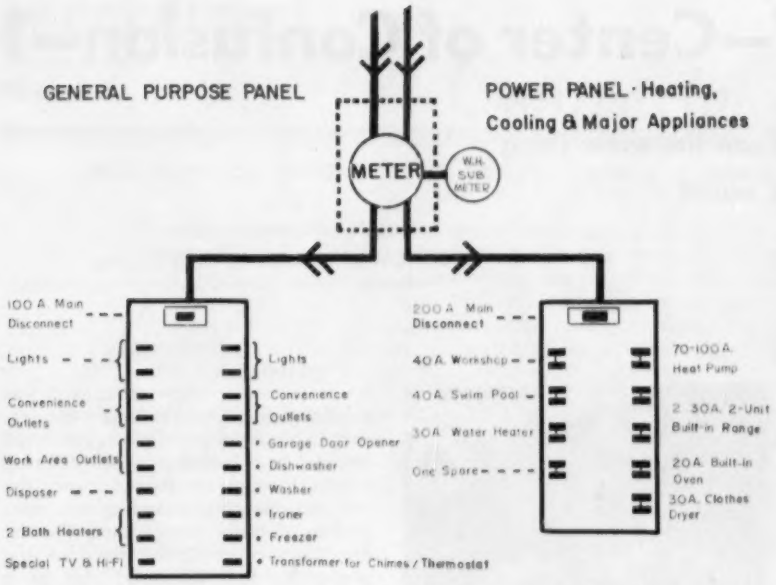
4	20 amp—Lighting	3,500 w
4	20 amp—Convenience outlets	3,500 w
2	20 amp—Work area appliance outlets	1,800 w
1	20 amp—Clothes washer	900 w
1	20 amp—Dishwasher	1,320 w
1	20 amp—Disposer	350 w
1	20 amp—Home freezer	400 w
1	20 amp—Ironer	1,500 w
1	20 amp—Transformers, chimes and controls	250 w
1	20 amp—Garage overhead door	900 w
1	20 amp—750-w color TV circuit	900 w
2	20 amp—1,200-w bath heaters	2,400 w
		17,720 w

$$\frac{17{,}720 \text{ w}}{240 \text{ v}} = 73 \text{ amp}$$

What does the contractor and wireman do to separate the circuits in making an installation at a house served with dual services? What appliances and circuits are placed on one service, what on the other? How does the wiring job differ from an ordinary one served from one service through a single panelboard?

These questions were asked of Los Angeles Department of Water & Power, which had recently announced its new policy of serving tracts of air-conditioned houses with dual secondary services—one for air conditioning that can also be used for major appliances; the other for lighting, television and small appliances. (See ELECTRICAL WEST, July 1955, p 74.)

In answering the questions the department sent the accompanying diagram illustrating the allocation of the circuits on the two panels and the load summary for these circuits, in accompanying boxes. ELECTRICAL WEST then visited a tract of new homes under construction to take the illustrations on these pages. These homes are in a high-bracket price range and include complete electric kitchen and laundry and provision for air conditioning. Known as Jemist Inc. homes, they are located in San Fernando Valley near Hanson Dam. Kaymore Electric Co. was doing



How the circuit breaker panel circuits are divided between the power and general panel

Finished appearance of cabinets in the wall

Service in Los Angeles

the wiring. Lou Press was electrical foreman.

Purpose of the department's policy is to maintain a high-grade, flicker-free service to customers on their lighting and TV circuits. The two services are dropped from alley poles to two service heads. Both conduits terminate in a meter cabinet and are metered by a standard two-element integrating meter with no connection between the elements.

The lower section of the meter cabinet is divided into two compartments to keep separate the two services. This section contains connecting and test strips and the cover is sealed by the utility. Two nipples connect this cabinet with the two circuit breaker panels below, each with its own main disconnect. From these panels the circuits are taken to their points of use according to the loads they are to serve. These are usually grouped in accordance with the accompanying diagram, which represents an example for a house of 2,000 sq ft equipped with a greater degree of electrical living. Scaled down, similar distributions can be arranged for homes with 100 amp capacity, 150 amp, or 200 amp.

The example here is for one with a 200-amp panel and a 100-amp panel, each with a main disconnect. The first can be considered the power panel, the other a general-purpose panel.

It is significant that all the space available for circuits in the 100-amp panel is used, leaving no spare circuits. A larger size might be advisable because of the increasing wattage of appliances in common use as well as new types of devices being introduced. Advising the owner to install the next larger size panel makes the job more profitable and assures the homeowner additional years of satisfaction and convenience without changes to his wiring system. Demand or diversity allowances are not advised by the department because of the constantly growing need for additional capacity as new uses are found for electricity in the home.

The homes illustrated here did not have this full capacity, nor did the first tract to which the department applied the dual service idea. However the separation of the circuits suggested in the diagram applies to the particular loads in any case.

The new electrical code of the city of Los Angeles takes cognizance of this plan of residential distribution. The jobs illustrated here are using flexible metallic conduit for circuits, permissible in Los Angeles, but these circuits could be run in conduit, metallic tubing or other approved wiring methods.

Removing of the heavy demand and starting loads from the service that supplies lights and television gives the customer far better voltage regulation and better performance of lamps and TV sets.

Kitchen has separate circuits come through the wall to serve lighting and heavy loads

Electrical West—Vol. 115, No. 5

"Grounding"—Center of Confusion—1

- **Why we do not all mean the same thing**
- **What should be done about it**

First of a series by Tom Hughes
Electrical Engineer, California Division of Industrial Safety

Probably the average reader will ask "how can such a simple practice as grounding be confusing to anyone?" But we challenge any person to read these articles and test his concepts. For many years the National Electrical Code has clearly described the means by which protective grounding is to be accomplished in electrical distribution systems but we find that those requirements are applied in many diverse ways and thus fall short of accomplishing the expected purpose.

The very word grounding would seem to suggest such a simple procedure but let us see how far it has digressed from its original meaning in differing fields of electrical endeavor. Everybody's "grounding" is not the same.

The radio man's—In the early days of radio reception an aerial and ground were necessary both for obtaining an adequate signal and reducing the body capacity interference between the set and approaching operator. All stages of the circuit were tied to the metal chassis and it to the earth. In diagramming the connections of complicated circuits the ground symbol was used frequently and still is. Today radio service men speak of grounding this or that component when actually they are connecting it to the B-minus bus; which may or may not be connected to the chassis, let alone to the earth.

The broadcaster's—On the other hand, radio broadcast engineers speak of the ground wave (describing that portion of the transmitter radiation that is received directly around the curvature of the earth) as compared to the sky wave (which reflects or skips to much greater distance off the ionosphere — Kennelly-Heaviside layer).

The power line engineer's—In the joint use of pole lines by overhead power transmission lines and communication circuits you hear the term "ground-return current" used by the communication experts and "ground-return circuit" used by the power men. The first refers to a complex series of

What causes 480-v switch and starter explosions such as this typical one of many?

interference effects in communication lines, induced by the power line harmonics and the second refers to a conductor or utilization of the conductors in the power distribution systems or communication system, which will rarely have any solid connection to earth.

The static's—In solving problems with electrostatic charges in industry many engineers miss the real aspects of the problem (sometimes with costly results or loss of production time) because they are told by others or assume that grounding is the simple answer. The other day we heard an engineer say that he had learned they are using radioactive materials for *grounding* static in machines. The misunderstandings that crop up in this pursuit of static are amazing, as we shall show in a later article under this title.

Portable tools'—In the grounding of portable tools or movable machinery we find the most confused ideas on what we are trying to accomplish. An inspector told an agency that the commercial machines they were selling would have to have three-wire cords installed for grounding. The manager called the writer in to learn what it was about and had the upper section of the console (containing the complicated controls) removed from the lower section to show us that it was grounded. We found that he was referring to a special piece of copper braid inserted at a bolted joint for assuring a bond through the paint between the two sections for overcoming any complaints of radio interference. On the blueprints covering this machine the draftsman had indicated this as a ground and the manager sincerely believed it.

Machine tools'—People in factories or industrial plants occasionally insist that a certain movable machine is grounded and take us out to show us that a bond wire has been installed around the flexible conduit at one or more motors mounted on the machine. These are just two examples of the many misconceptions we find concerning portable or movable equipment. In a later article we will make a thorough study of the real problems encountered in the use of portable or movable equipment and show how we of the electrical profession are missing the boat by our emphasis on grounding of hand tools as the solution of these problems.

We have enumerated a few of the ways in which the objectives seem to be conflicted or confused by use of the word "grounding." There are other minor aspects not worth taking up space with here. The ideas of various factions are so diverse that Knowlton's Electrical Engineer's Handbook uses the word "earthing" when signifying that a raceway or electrical system is actually tied to the earth. In radio and electronic equipment our contemporary use of the B-minus bus (as a zero potential point for all components) has gotten so far from the original idea of grounding that some electronics engineers are suggesting it be called a "reference bus" and drop the word ground entirely.

So, we hope we have laid the groundwork for our proposals to drop the use of the words grounding and grounds in all pursuits of the electrical industry and choose new words or expressions that more clearly express our objectives.

ELECTRICAL WEST Contractors' News Letter

QUICK NEWS ON TRENDS, LAWS, CODES, MATERIALS, EQUIPMENT, COSTS, WAGES, ETC.

Some 36 manufacturers of electrical materials announced price increases the last week of October and similar increases were noted throughout the last month. These reflect the increased wage, copper, steel, zinc costs reported earlier. Although copper seemed settled for the time being, with more supplies in view and top capacity production, the end products will be some time catching up. The copper situation has again given steam to the often thought of substitution of aluminum wherever possible.

Prices inch up

Residential building starts are reported somewhat lower than in previous months. This could be seasonal and normal or could indicate approaches to saturation in tract housing. Because they no longer sell like hotcakes, builders are turning long overdue attention to lighting and wiring as possible attractions.

Seek sales gimmicks

Tightened credit is charged with the reduction in the residential building volume in September by the F. W. Dodge Corp., which reports on building trends. Nonresidential building, however, was up 10% above the September 1954 total. The outlook is good for a good volume of construction business for the remainder of the year, good weather permitting.

Brakes on

Preparation to offset any dip in residential business is being made in a nationwide building industry national advertising and promotion program called "Operation Home Improvement," which is scheduled for 1956. All branches of the building industry and their associations are tying in. NECA represents the electrical contractors. Meetings have already been started to acquaint the industry with the potentialities for home improvement in all fields. A seal and slogan have been developed and support of many national consumer magazines has been assured.

Fix up drive

Los Angeles has set a new wage pattern for the state and perhaps even the West when it agreed to a new electrical workers scale effective Jan. 1. NECA and Local 11, IBEW, agreed to a new journeyman's rate of $3.45 until July 1, 1956, when up it goes again to $3.60 until June 30 of 1957. This applies to Los Angeles County only. No job protection either. The line local No. 18 gets $3.45 to Oct. 31, 1956. However there is no vacation or health and welfare in the Los Angeles rate but watch other locals aim now to get the Los Angeles rate plus the fringes.

New goal

Two comments from the industry seem significant—One, "Los Angeles unions must want to bring back open shop again." The other, "The government isn't the only customer any more. Will ordinary customers buy that?"

Questions

No very controversial items are on the ballot to be voted at the National Electrical Contractors Assn. convention being held in New York City as we go to press. Under the new procedure, members no longer vote but their chapter governors do. Before them are some amendments to dues provisions and the question of establishing a new district comprising California and Nevada, separating it from the present District 6 which includes Washington, Oregon and Alaska. Field operations have already been so separated. The California conference of NECA Chapters requested a new district.

Seek new district

The dues provisions to be voted upon include one to set the same maximum on chapter dues as was recently set on national dues. This would affect the large traveling contractors. Another, which is debated hotly, is to make dues collectible only on the straight-time labor pay roll, not overtime. Objection to this by chapters is the complicated bookkeeping that would be required. Another would limit Canadian dues because of lack of service in that area.

Dues blues

Good Housekeeping magazine for November deserves industry praise for its pitch on adequate wiring and 100-amp service. The article is aimed at housewives and is nontechnical, being satisfied to advise housewives to insist on having adequate wiring.

Thanks

Since time immemorial California has had different adequate wiring standards from the national ones. However, Northern California Electrical Bureau has now decided to adopt standards identical with those of the National Adequate Wiring Bureau, published in "Residential Wiring Handbook," and prepared by the "Industry Committee on Interior Wiring Design." This will require a range outlet in all cases. Built-in bathroom electric space heaters will not be mandatory but recommended and No. 14 wire will be permitted for general purpose circuits under certain conditions.

Accept standard

Other code and ordinance news includes—Salt Lake City electrical ordinance now requires installation of 1¼-in. conduit or EMT on all service entrances for 1,500 sq ft or less residences with No. 2 copper conductors. One-and-a-half-inch conduit with 1/0 copper is required for those over 1,500 sq ft. A range circuit and receptacle will be standard and exterior main disconnects will be required only where service is classed as not accessible by the inspector or where service runs are excessive inside a residence . . . Sacramento County's board of supervisors adopted revisions to the county ordinance Oct. 19, effective Jan. 1. Permit fees have been increased to compare to those in Sacramento. A 100-amp main service for all dwellings of 900 sq ft or more is required in 1¼-in. conduit. Dwellings wired for ranges or dryers are to have 100-amp minimum service, regardless of floor area . . . Adoption of 100-amp minimum service is being considered in Fresno where the local ordinances are under review.

More 100-amp

Communist-dominated unions in Canada have staged a comeback by the action favoring their admittance at the British Columbia Trades Union Congress convention last month. The swing to the left was attributed to the recent purges of B. C. electrical and carpenters unions by their international officers in the United States. The late J. Scott Milne had sent 10 representatives in to clean out the communist leadership of the IBEW locals.

Back lash

A new contract was reached between Local 213, IBEW, in Vancouver and the B. C. Electric Co. on wage rates with a 3% boost retroactive to Aug. 1, raising the scale from $2.30 to $2.37 now and $2.41½ next August. It is expected to set a pattern involving other employers of IBEW labor in the province. There is a dispute underway now between IBEW and Hume & Rumble, Peterson Electrical Construction Co., Canadian Westinghouse Co. Ltd. and eight others.

Set a pattern

Sacramento's Parade of Homes showed the trend toward electrical living. All 25 homes had 100-amp or larger service entrance, 13 had certified wiring and several others came very close to a certificate. In the 13 AW homes the average number of circuits was 14 while one home had 30, another 20 and one 17, and no home had less than 11 circuits. No. 12 wire was the smallest used in any.

Most modern are electric

FHA Commissioner Norman Mason announced plans to consolidate the FHA mortgage insurance activities in the Los Angeles-Long Beach area to make an annual savings of $126,000. Insuring operations of Long Beach will be integrated into those of Los Angeles. However, a local office will be maintained there to embrace also Orange County and the southern portion of Los Angeles County.

Consolidates

Even the public power association group is interesting itself in adequate wiring. Fifty delegates attending the Power Use Section of the Northwest Public Power Assn. in Seattle Oct. 21-22 had wiring as one of the chief items on the agenda. Jack R. Criswell of Franklin County PUD was named chairman for 1956 and Pasco, Wash., selected for the 1956 meeting.

Waken to wiring

National Electrical Week is to be observed annually beginning Feb. 6, the week of Edison's birthday. This proposal, made by the International Association of Electrical Inspectors, has received the endorsement of National Electrical Manufacturers Assn. and nation-wide publicity to Electrical Week will be given. All the national associations are coordinating in the program.

Capt. Sanislo started it

Another recruit to AW promotion is the Owens-Corning Fiberglas Corp., which plans to support the industry's program in 1956. It will advertise in both consumer and trade press, urging 100-amp services as minimum.

Glass joins

Hill Transformer Co. at 1030 Washington St., San Carlos, Calif., has just joined NEMA in the Specialty Transformer Section, according to Max E. Hill, its president.

Joins

Tax hungry

The trouble with sales tax is that the rules keep changing with the personnel. After long negotiation for unified interpretation years ago, electrical contractors thought they knew when to charge sales tax on labor and when not. Recently the sales tax division of California claimed tax due for the past three years on labor in putting on crossarms on poles and stringing wire. The position is taken that since the crossarms and wire may be removed they are classified as personal property and labor of installing it is subject to the tax.

New NECA managers

Matt Gallagher Jr. has been appointed manager of the California Central Coast Chapter, NECA, in Santa Barbara on a full-time basis. He will have his office at the same location as Will Pregill, who has been manager on part-time basis and will instruct the new manager. Gallagher is a legal and public relations man and plans to initiate a chapter program on research, education and business promotion . . . Montana Chapter of NECA has decided also to employ a full-time manager. Joe Bollinger, field representative, has acted as manager during the past year.

Widens scope

Underwriters' Laboratories Inc. announces that its hazardous location equipment list has been retitled. It contains a Sec. 2 entitled Equipment Related to Hazardous Locations. Included are devices not intended for operation but which are designed to indicate certain potentially dangerous conditions with respect to such locations.

Their final

Death took two well-known contractors in their respective areas in October. Eugene J. Gartley, 73, who headed Bakersfield Electric Co. for years, starting in business in 1921, died following a prolonged illness. His company is now headed by his stepson, Robert N. Ward . . . Harry J. Alfiers, a partner with Arthur Sousa in Broadmoor Electric Co., San Leandro, died suddenly of a heart attack Oct. 19. Both he and Sousa had originally been with Pacific Electric Motors for about 16 years, leaving in 1945. They formed Broadmoor Electric Co. in 1948, of which he was vice-president and recently acting president.

Takes two for Harry

A big testimonial banquet was given to Harry V. Dobson, who retired as chief electrical inspector and city electrician of Santa Barbara for the past 28 years. About 250 friends and fellow workers were present and the NECA chapter presented him fishing gear, the city council a framed resolution commending his service. He plans to open an office as consulting engineer. Ray Emery, former foreman of the maintenance division of the electrical department, was promoted to city electrician and placed under the department of public works. James Bradsberry, former deputy electrical inspector, was promoted to chief electrical inspector and Arthur R. Koehler of the maintenance division was made deputy.

Cool men

Montana Chapter of the Refrigeration & Air Conditioning Contractors Assn. held a two-day meeting at Great Falls Oct. 8 and 9, and the Spokane group met with Ray Kromer, executive vice-president, on Oct. 10. The association recently announced a change in policy that all future national programs and campaigns will be conducted through local associations. O. B. Lund, president of RACCA of Montana and northern Wyoming was unanimously elected director to fill the vacancy created by resignation of B. C. McCall of Chattanooga. He will serve as director from the sixth district.

Grounding studied

A gas stove energized by the breakdown of the cord serving the electric clock on it resulted in the death of a child. This and the California Public Utility Commission's consideration of permission to water utilities to disconnect water service used for grounding and the introduction of much plastic piping caused the Northern California Chapter, IAEI, to appoint a committee to submit its views and data to the Public Utility Commission.

Changes

Joe Madl of Glenmart Co. moved his office to 6440 E. Corvette St., Los Angeles. . . . C. C. Blecksmith, Duncan Electric Mfg. Co. representative, has also moved and his new address is P. O. Box 54, Covina, Calif. . . . Ed Byers, formerly with Standard Wholesale Electric, has moved to California Wholesale Co.

Standardize

For low-voltage control systems at 24 v or over, the chapter coordinating committee of the Southern California Chapter, IAEI, recommended 300-v No. 18 wire as conductors.

New jobs

Among people, maybe you have heard that Incandescent Supply Co., San Francisco, now has William Klose, former electrical contractor in the Peninsula area, as salesman for the San Francisco territory, beginning in October, and Robert Coleman as its advertising manager . . . Stanley Johns, at one time district manager of Westinghouse Electric Corp. in Los Angeles, returned from another job in the east and is now vice-president of Electric Corp. in Los Angeles . . . Ray A. Zimmerman of Square D Co. has been promoted to regional sales manager and Western Division sales manager.

Branch in north

The Electrical Estimators, a three-year-old service organization making fixture, panelboard, transformer and underfloor duct take off from plans and specifications up for bid, for electrical manufacturers and distributors in Los Angeles, has established an office in San Francisco to sell the same kind of estimating service. Charles H. Hays has selected an old friend, Harold L. Hahn, to run the new San Francisco office in the Builders Exchange, 666 Mission St. Complete material take offs are also made on big jobs for electrical contractors.

Show ahead

Electrical Maintenance Engineers Assn. of So. Calif. annual show is to be in charge of this same Charlie Hays next year. Dates are April 5-7, 1956, and it's to be at the Shrine Auditorium, Los Angeles. Already 59 exhibitors have signed for space. Fred Tabor, showman, will do the heavy work that the members themselves broke their necks on for previous shows.

Pioneer

George Ashlock, an electrical old-timer in the Bay area and at one time representative for U. S. Motors, died early in October.

Warm up on heat

To present the industrial heating course to some 58 representatives of local industrial plants, Washington Water Power Co. of Spokane has enlisted the aid of the engineering department of Gonzaga University. The course will be the metal sheath electric heater course, prepared by the National Industrial Electrification Council.

Standards review

Important meetings of the RLM Institute, the NEMA commercial and industrial lighting committees, and Underwriters' Laboratories on lighting standards are scheduled in New York the first week of November. Leonard Hobbs, vice-president, Smoot-Holman Co., and Western representative to many of these groups, will attend.

Replaces old one

Wiremold has just issued a new catalog and wiring guide, No. 20, available to electrical contractors. It includes many new fittings and an announcement of a new series of receptacles. Those which have been obsoleted are likewise listed.

Picture the way

Anaconda Wire & Cable Co. has issued a step-by-step pictorial direction pamphlet for making all types of cable joints in neoprene-jacketed Durasheath cables . . . Also announced is a new 4-page folder describing its Powerduct cables for flexible bus-drop power distribution.

New starts

Motor-starting currents are made the subject of a new standard resulting from a joint committee on motor-starting currents of the Association of Edison Illuminating Companies, Edison Electric Institute and National Electrical Manufacturers Assn. Known as NEMA publication No. 151-1955, it is available at 25c.

Xmas cheer

It's Christmas lighting season and there are many tools with which to make it bright. General Electric Lamp Division has reprints of "Trends in Christmas Lighting" from its "Light" magazine available. It likewise has announced the sponsorship of an annual $5,000 nation-wide residential lighting contest. A plan book, "Your Holiday Lighting Contest Guide," is available from the Lamp Division at Nela Park.

Home text

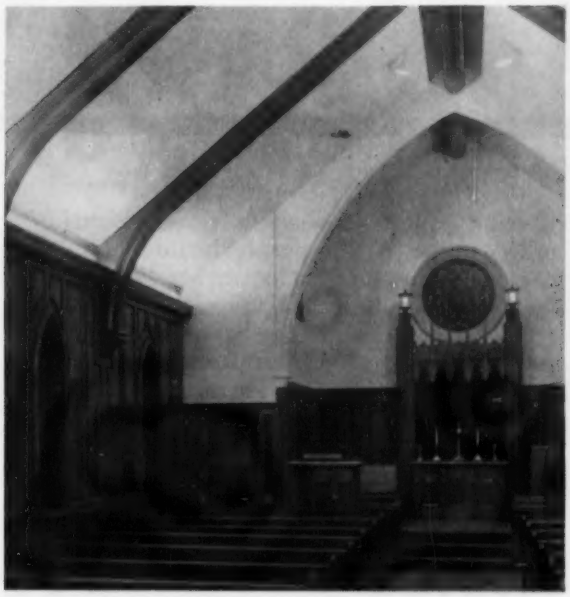
Home lighting is the subject of a new book. "How to Decorate and Light Your Home" is the title of a new book by Eugene W. Commery and C. Eugene Stephenson, and to be published by Coward-McCann Inc., to sell at $6.75.

More light

From Westinghouse Electric Corp., Myrtle Fahsbender, director of residential lighting for the Lamp Division, has material available on garden and outdoor lighting, which she is giving in colored-slide lectures.

Bigger

And then there is the lighting fixture manufacturer who borrowed $250 from the bank to start in business. He is doing pretty well now. He now owes the bank $250,000.

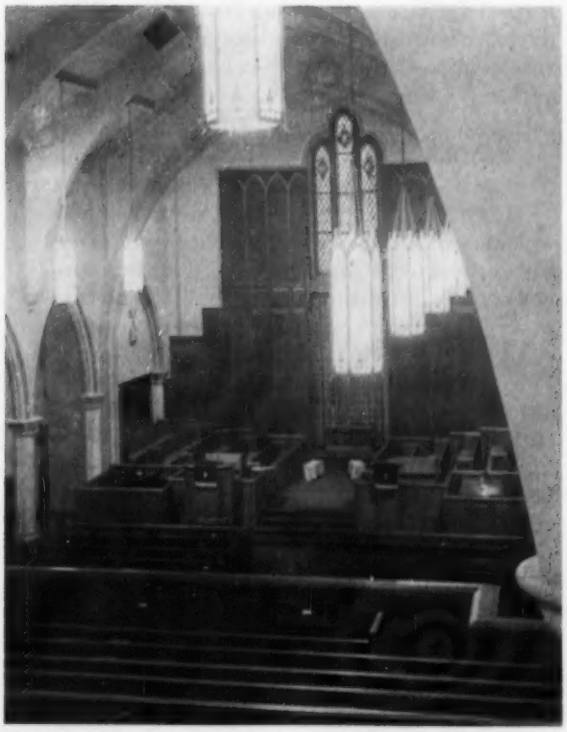


Small chapel has slimline coves, reflector spots units on altar

Social hall uses glass bowls, has concealed floods toward stage

Salt Lake Church Wired for Future

Fixtures choosen to blend with use of space in new Baptist edifice



Main sanctuary lighted by 14 suspended fixtures, plus downlights

Having outgrown its downtown location, the 1,500-member congregation of the First Baptist Church of Salt Lake City recently erected a modified Gothic church, built on four levels on a hillside on the east bench. Both the outside floodlighting and interior illumination of sanctuary, chapel and social hall were planned for present need and anticipated future requirements.

Unique circuit features include: long feeder and service runs which required more attention to voltage drop than to carrying capacity, centralized circuit protection, feeder design for anticipated total connected load, provision for 100% unbalanced load and selective supervision of branch circuits. Two services in parallel, each of three 400-MCM cables, and a No. 2 conductor in 3-in. conduit run 200 ft underground to the boiler room. Here after metering the service splits for a 40-ft run to the main control panel. One serves general and emergency lighting, the other power for kitchen, gymnasium and boiler room. The gymnasium is to be added later.

Lighting of the main sanctuary, seating about 1,000, combines visible suspended ceiling fixtures and concealed spots and floods to accent certain areas. The main body of the pews is lighted by 14 suspended units with six 60-w lamps in each, switched in four groups. During song service 300-w downlights in reflectors add light on the hymnals. Within convenient reach of the organist are switches to control organ, light a stained glass window at the back of the chancel, four 300-w floods, concealed by an arch, to light the choir bays and four 150-w reflector spots on organ and lectern. Similar lighting control is had in the small wedding chapel, seating 125, adjacent. Electrical installation was made by Thompson Electric Service.

ELECTRICAL WEST

End of Power Shortages in Sight

MORE portentious and significant than the discoveries of Watt and Edison was last month's announcement by Chairman Lewis L. Strauss of the Atomic Energy Commission that the government has a five-front project to develop hydrogen fusion to supply a vast new source of "inexhaustible power." If, as Chairman Strauss predicts, a way to harness fusion or thermonuclear power may be found within the next 20 years, then there will be no power shortage—ever. Even if the practicability of fusion power is delayed 50 years, fission power plants can supply the world's requirements in the interim. The fact that more power will cease to be one of mankind's pressing problems is what makes Mr. Strauss' announcement so momentous.

Separate Politics and Power

POLITICAL maneuvering that would continue and intensify the power deficiency in the Pacific Northwest unless the federal government furnishes the new capacity was debunked recently. Clarance A. Davis, Under-Secretary of the Interior, put the issue in simple language in a talk in Portland, Ore., when he said:

"The time has come to start getting down to facts, to strip away some of the political bunk and to pull the sheep's clothing off some of the Socialists who are utilizing this issue to achieve political objectives.

"Our position is that the needs of this rapidly growing area are tremendous, that it will require the best efforts of all of us, federal, state and local, to meet those needs; that the problem is to furnish a power supply and we ought not to cast a wet blanket on any reasonable method for augmenting that power supply; that the federal government should continue to participate in that program; that the need is so great and the time so pressing that we should utilize all of the resources of all of us to be sure that we meet that need.

"On the other hand the views of the federalizers on the issue are quite clear. They believe that the federal government should have an exclusive monopoly of hydroelectric power in the region; that it should build all of these dams and that for anyone else to be let to do so is a give-away; second, that the federal government has an obligation to supply the electric power for this region (where it got that obligation is not made clear); and third, that the federal government can meet the situation bigger, better, quicker and cheaper than anyone else."

Typical of the kind of tactics to which Davis referred are the efforts to substitute the Hells Canyon high dam for the orderly and more economical Idaho Power Company three-dam development. In the same catagory is the opposition to the John Day project by Senator Morse and Senator Neuberger ("I would rather leave these sites vacant and undeveloped for a later and wiser generation to use in the public interest than to have someone say 'you surrendered those sites.'").

It may be too much to hope for the day when power and politics will be separated. Certainly the two are going to be closely intertied between now and November 1956, despite such sound reasoning as Under-Secretary Davis propounds.

Promises Go Out the Window

TIME after time during the Western hearings of House Government Operations Subcommittee Congressman Chudoff announced that representatives of private power companies would be given an opportunity to tell their story as soon as the public power bodies had been heard. Now Representative Chudoff, having made political campaign capital with his one-sided hearings, has announced that the power companies "may be called to testify, perhaps next year."

The injustice of this refusal to let private companies be heard has been clearly set forth by EEI President Harllee Branch. This "is no fair or satisfactory response to our request for an opportunity to refute the charges which have been made against us while they are still fresh in the public mind and before the politicians and subsidized-power groups have used

EDITORIAL VIEWS

these charges and insinuations to crystallize public sentiment against us. A public and a press which condemned one-sided congressional investigations last year will see in this denial an unparalleled refusal of the ordinary rights of American citizenship."

Gas Attack in the Northwest

NOT all gas aimed at the Northwest will come in pipelines or tanks. It is already making its invasion by an attack of propaganda that would be highly amusing if it were not that a lot of people, even some appliance dealers, seem to be overcome by it and lose their sense of reality. That the gas people have been able to make these cynical souls actually think that gas is something new, something wonderful, something even more than atomic power, is incredible but it is true. One person was even heard to say he hoped he could convert his home to this "new gas."

Of course the "new" will soon wear off as soon as it actually comes and people find that it is the same old stuff that went out with the horse and buggy years ago. But unless the electrical industry gets busy informing the public just how "new" it really is, a lot of people will fall for the phantasy that it is some new miracle and spend money converting—not forward but backward. Progress is not to be found in that direction.

How to Get a TV Program

IF MORE utility presidents would sprain a knee, there might be a general quickening of interest in television as a means of telling the power company's story to the public. Heresy? No. The spouting of a deranged mind? Again, no. Consider these facts:

A year ago a utility president, who shall be nameless, purchased a television set to watch the Big Game (Stanford vs California to the uninitiated). The set served its purpose and sat in his den, virtually unused for months. Then one day he slipped and severely sprained his knee. Recuperation involved staying at home, off his leg, for four or five days. For relief from the paper work sent from his office, he watched television—lots of television.

Back on the job one of the first things the president did was call in his advertising manager. "What we need," he said emphatically, "is a good television program to get our message over to our customers and the public."

"Mr. President, we have been working on an idea for such a program for two months," the advertising manager told him with cheerful surprise. "We'll have a recommendation in your hands within a week."

Result is an outstanding 39-week series of 15-minute TV programs which will be telecast over three stations in the company's service area.

So we repeat: if more utility presidents would sprain a knee, there might be more good power company television programs.

You Can Say That Again

THE AMERICAN Revolution, essentially, was not a series of battles between the British and the Colonists. It was a revolutionary idea: a sovereign people and a servant state, a reversal of the Old-World order. Many of us believe that we in the U. S. A. are now moving toward the very arrangement we escaped: a sovereign state and a subject people. When our formal and legal agency of society served to invoke a common justice to defend the rights of all citizens equally, it was indeed a servant. But controlling the creativity of the citizens is a different thing. To the extent that government moves into the control of creative actions, to that extent does government desert its servantcy and assert its sovereignty. This is a valid way to assess the trend of our times, to see clearly the issue between libertarianism and authoritarianism. — Leonard E. Read, president. The Foundation for Economic Education.

A MESSAGE TO AMERICAN INDUSTRY • ONE OF A SERIES

Automation Creates Jobs For Workers With Skills

There is new and reassuring information for those who fear that "automation" — the control of machines by machines — will mean fewer job opportunities. It comes from a special survey of 1,574 companies in metalworking industries recently completed by AMERICAN MACHINIST, a McGraw-Hill publication. More than one-fifth of the companies reported that they already have automatic loading, transfer or assembly machinery in operation. In these companies as a whole there has been a net increase in total employment since this machinery was installed.

According to the AMERICAN MACHINIST survey, of these companies with actual experience in automation

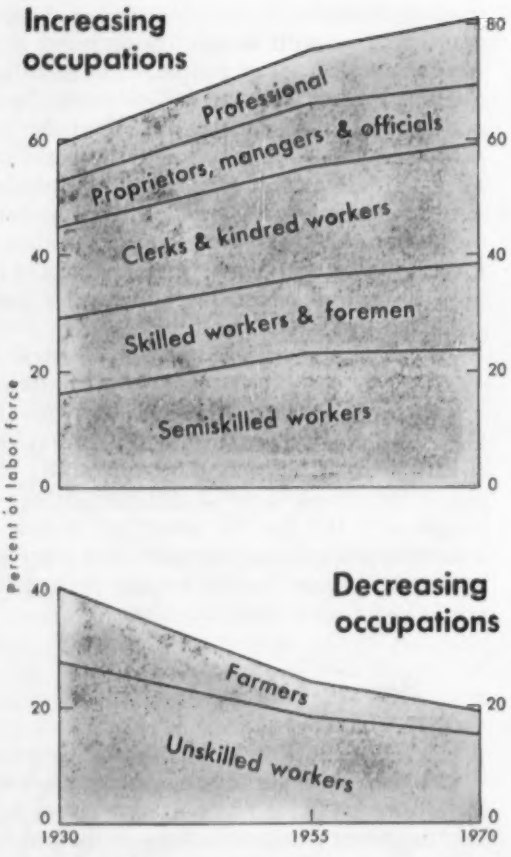
- 26% reported increases in employment averaging 21%
- 51% reported no change in total employment
- 23% reported decreases in employment averaging 16%

More Jobs for the Skilled

Of greater significance, however, is the response by 40% of these companies that they required more skilled maintenance men and by 21% of the companies that they had increased their engineering staffs. This indicates that automation is strengthening a trend already evident in the United States, a trend of expanding opportunity for those with industrial and professional skills and, relatively, of contracting opportunity for the unskilled.

The following chart shows how strong this trend has been over the past 25 years and how strong it may be expected to be over the next 15 years.

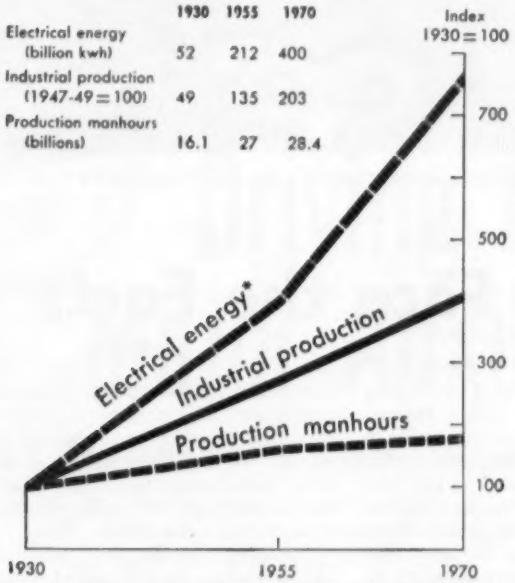
There has been a sharp decline in the percentage of unskilled workers in the nation's labor force and a corresponding increase in the percentage of those with varying degrees of skill.



It is possible, of course, to cite cases of individuals and groups that do not conform to the charted trends. Farmers, for example, are becoming at the same time more skilled and less numerous. But this does not upset the broad proposition that opportunities are increasing for those who have skills.

Power and Production

Much of the basic explanation for the relative expansion of opportunities for those with industrial and professional skills lies in the increasing use of power-driven machinery. This has made possible a vastly greater increase in manufacturing production than in the manhours of human labor devoted to it. The following chart shows the relative increases in electrical energy and manhours of labor used in manufacturing since 1930 and the rise in industrial production.

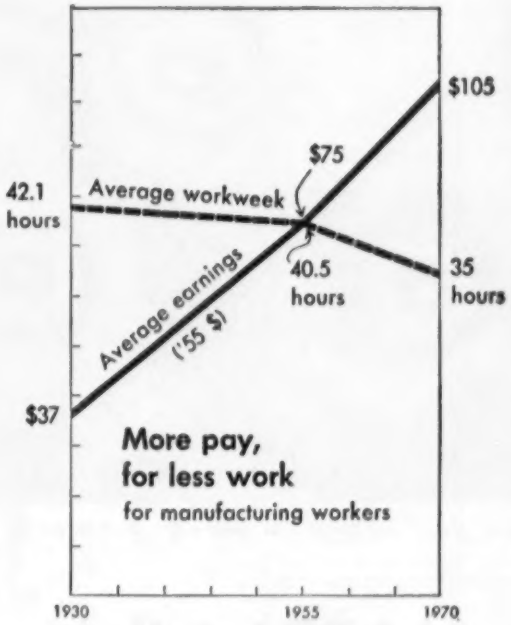


*Excludes power used in aluminum and magnesium reduction, both very heavy power users.

Power-driven machines have reduced the amount of human energy required for physical labor, but they have increased the need for skillful handling and maintenance. As the AMERICAN MACHINIST survey demonstrates, the same is true of automatically controlled machinery.

Higher Wages, More Leisure

The rising average wage of American industrial workers and the decline in hours per week that they must work reflect directly the extent to which the increase in industrial production has outstripped the manhours devoted to it. The final chart shows the increase in weekly wages (in dollars of constant purchasing power) and the decrease in the average workweek in manufacturing since 1930. It also shows the changes that may come in the next 15 years if present trends continue.



There are some who would slow what an earlier editorial in this series characterized as "the continuing process of taking dull and laborious work off the backs and minds of men and transferring it to machines operating in large batteries under automatic control." In doing so, they might make the world safer for those with no skill. The far more constructive course is to welcome the expanding opportunities now being provided and be sure that the nation's young people, who are now starting another school year, are prepared to take advantage of them.

This message is one of a series prepared by the McGraw-Hill Department of Economics to help increase public knowledge and understanding of important nationwide developments that are of particular concern to the business and professional community served by our industrial and technical publications.

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Donald C. McGraw
PRESIDENT
McGRAW-HILL PUBLISHING COMPANY, INC.

"Duke" Imholt and native sons made a live show to get the 1958 national convention for its Golden Anniversary by the Golden Gate

NAEDistributors Face the Facts

Stark frankness concerning electrical supplies distributor problems and relationships with manufacturers and contractors made the 47th annual convention of the Western Region, National Association of Electrical Distributors, at the colorful Empress Hotel in Victoria, B. C., Sept. 26-28, an exceptionally worth-while one, the 400 or more who attended reported. No punches were pulled by any of the speakers in facing up to the facts of sharp competitive practices, of voidance of distributor functions and foolish credit extension that have plagued this branch of the industry and made a profitless prosperity.

Representatives from every one of the 11 Western states, as well as Hawaii and Alaska, were present. Irving P. Bean, Bean Electric Co., Seattle, regional chairman, presided over an exceptional program arranged by William M. Jewell, regional manager.

What was happening to the distributing business as well as the opportunities for improving it were handled with extreme frankness by 13 speakers, including manufacturers, contractors, financial men and distributors themselves.

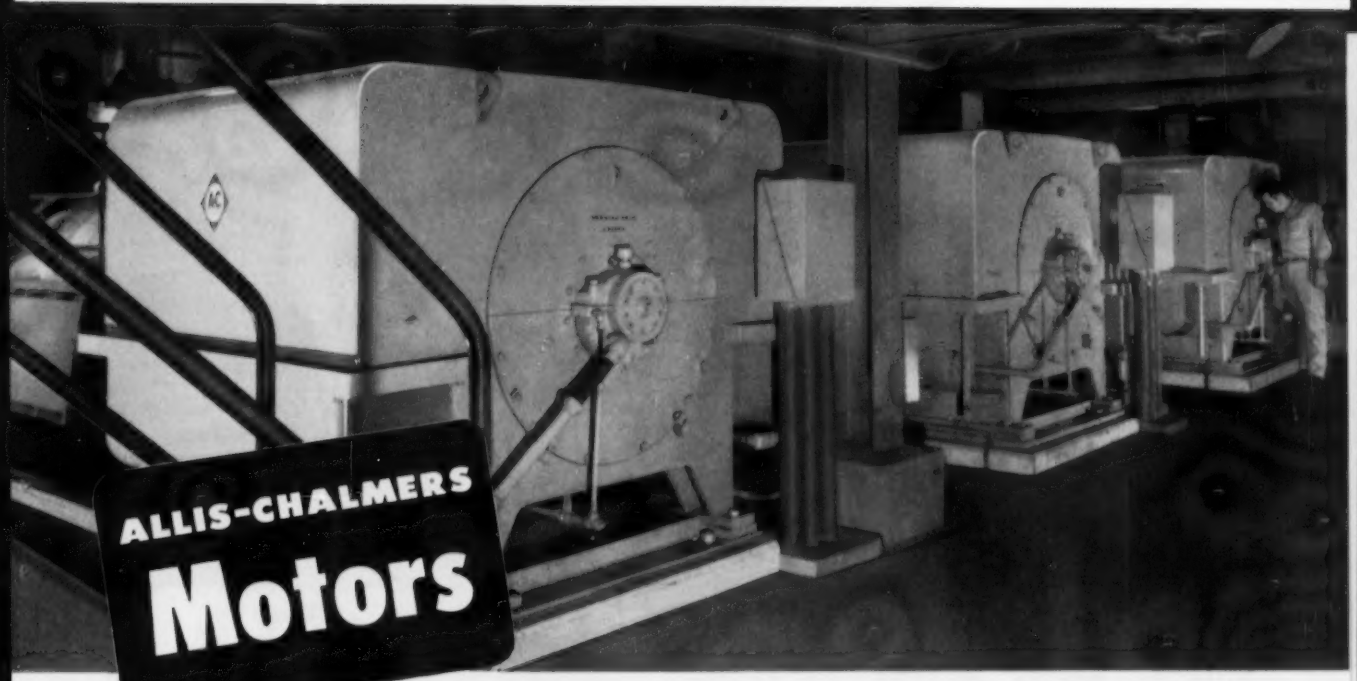
Arthur W. Hooper, executive director of NAED, laid the field, after a welcoming address by E. W. Arnott, vice-president, B. C. Electric Co. Ltd., by enumerating in a little poem the ten functions distributors should be performing to justify their place in the distribution chain, many of which they have been dropping. While Hooper agreed there was an economic value to a manufacturer in having four or five central distributing points at key centers, a network of warehouse stocks by manufacturers does not serve the best interests either of the public or anyone in the electrical industry. He went on to say that the "greatest threat to the electrical wholesaler today is not what others are doing to him—it is what he is doing to himself," namely, losing his identity, letting his economic foundations wash away, forgetting what he has to sell, not performing the sound business functions that he should.

Harry Vincent recalls past jobber meetings

Speaking for electrical contractors W. R. Grasle, vice-president, District 6, NECA, of Portland, Ore., told them that the reason the May 1955 District meeting had adopted a resolution requesting the national office to "investigate the possibility of establishing a central purchasing office with the object of buying at prices to meet such competition" was because distributors, through extended credit plans, continued to establish and maintain irresponsible contractors or become outright competitors. They are forcing contractors to seek other channels for obtaining their supplies.

He defined the two types of contractors that jeopardize the profit structure of the entire industry—the one who lives by his wits to "get the job" and come out by manipulating a gullible supplier and, second, the man with more ambition than knowledge and capital to handle large contracts. Where a distributor urges such a man on and finances him, he practically enters the contracting business.

He recommended that the responsibility for estimating and financing of work be left to the contractor, he urged maintenance of uniform price sched-



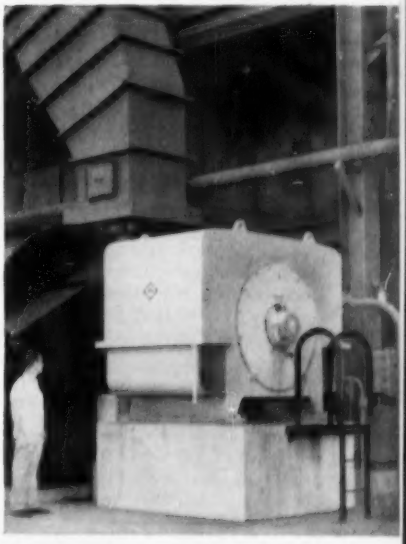
Three of the six 1750-hp, 3575-rpm, 2300-volt Allis-Chalmers two-pole motors providing unusually quiet drives for boiler feed pumps.

Driving ALL Major Auxiliaries

at Houston's New Webster Station

Weather-protected Allis-Chalmers motors are used throughout the modern outdoor Webster Station of Houston Lighting and Power Company. They provide low-cost outdoor installation plus dependable operation under all weather conditions.

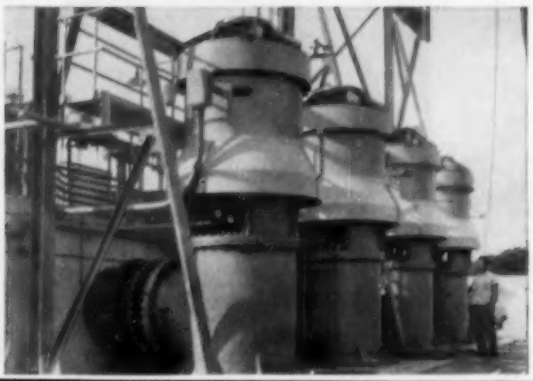
These motors are but a few of the complete line of motors Allis-Chalmers builds for power plant service. Check with the A-C office in your district or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin. A-4832



Two 350-hp, 1170-rpm, 440-volt Allis-Chalmers condensate pump motors.

One of four 1250-hp, 880-rpm, 2300-volt cage motors driving forced-draft fans.

ALLIS-CHALMERS



Four 800-hp, 514-rpm, 2300-volt vertical Allis-Chalmers circulating water pump motors.

Engineers and Constructors — Ebasco Services Incorporated

Hartwig Hooper Bean

Bennett

ules based on quantities purchased, and establishment and maintenance of sound cash discount policies, and setting up local committees to work with contractors on basic policies and business promotion.

The manufacturer's view was ably presented by R. C. Bennett Jr., vice-president, National Electric Products Co., Pittsburgh. Malpractices both by distributors and manufacturers such as direct shipments, "bringing in the order with a price to the contractor" and the encouragement of such practices by distributors, are breaking down the relationship between the two. "The road we are now traveling leads back to the old jobber concept of doing business," he said, and it may lead to the manufacturer selling direct to customers, cutting the distributor out completely. He called for manufacturers to be more selective as to whom they will sell and distributors not to stock more competitive lines than they can do justice with.

Along a similar vein, Garlan Morse, director of Pacific Coast sales, Sylvania Electric Products, San Francisco, outlined the benefits to wholesalers by participation in the Certified Lighting program but went on to emphasize the need to reinstate exclusive or selective franchising to return to profit margins and keep the business growing soundly.

L. M. Nichols, consultant to the operating cost committee of NAED, cautioned against overselling by high-pressure methods, extension of credit to bad risks and warned of a downward spiral in gross margins and net profits from which they could not recover.

Monte M. Wheeler, manager, Pacific Region electric housewares department, General Electric Co., emphasized the low saturation of popular traffic appliances and told of new products yet to come, urging capitalization upon the public interest in these devices.

NAED President Lester E. Barrett of St. Louis gave an illustrated preview of the 1956 joint industry campaign to promote adequate wiring. That adequate supplies of copper for all electric needs will be forthcoming and the industry need not be too hasty to substitute other conductors was the message of Jean Vuillequez, vice-president and director of sales, The American Metal Co. Ltd., New York. Thomas Mellon, vice-president and director of sales, Wesix Electric Heater Co., San Francisco, outlined the potentials in the growing electric home heating market and urged distributors to exert more selling effort on this line.

At the chairman's dinner, A. H. "Bill" Gudie, president, Biddle Trade Publishing Co., gave a straight-from-the-shoulder talk on the interrelation of manufacturers, their agents and distributors to create a sound financial condition in the business. D. D. Pulsifer of Canadian Westinghouse Supply Co. welcomed the members on behalf of the Canadian Electrical Distributors Assn.

Tom Mellon waxed hot on electric heating

At the election of officers W. B. Meek, WESCO, Los Angeles, was elected chairman for the Western Region for 1956, succeeding Irving P. Bean. They also voted to hold the next annual convention at the Westward Ho Hotel, Phoenix, in late September or early October 1956.

Responsible for the multitude of arrangements that made the big convention highly successful, not only in a business way but from an entertainment standpoint, were William M. Jewell, Western regional manager, NAED, aided by James B. Hartwig, North Coast Electric Co., Portland, as program chairman; Irving P. Bean, chairman; Leslie Stusser, Stusser Electric Co., Seattle, general arrangements; John Lawton, Graybar, Seattle, golf committee, assisted by G. A. O'Brien, Phelps Dodge, Seattle; O. B. Hubenthal, G-E Supply Co., Seattle, and A. L. Wiegenstein of WESCO, Seattle, who managed arrangements for entertainment and their wives for the ladies' entertainment.

The San Francisco delegation made a strong pitch to have the 1958 national convention come to San Francisco under a slogan "The Golden Anniversary by the Golden Gate in 1958." It will be the 50th anniversary of the national association.

The claim to the 1958 convention is based on the prior meeting of the Pacific Coast Jobbers Assn. in the spring of 1908, some months before the national convention that organized the association later that year. Chairman Bean had asked Charles Goodwin to prepare a formal resolution of invitation. Tom Mellon, as president of the San Francisco Chamber of Commerce, added his invitation. A parade with posters, songs and speeches climaxed the petition for "'58."

Hotpoint Versatility Builds Utility Revenue

These Hotpoint Value Leaders...

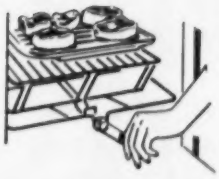
Hotpoint Deluxe Double Oven Pushbutton Automatic Electric Range—Model R866

Hotpoint Deluxe Pushbutton Automatic Electric Range—Model R865

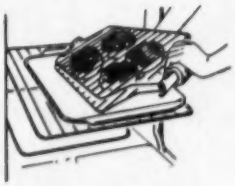
The World's Fastest Cooking with Hotpoint's exclusive new Super "2600" Calrod®

- ★ Pushbutton Cooking—color keyed to surface units
- ★ Raisable Thrift Cooker—also provides 4th surface unit
- ★ Golden Bake Calrod Unit • Golden Broil Calrod Unit
- ★ Time Center—cooks meals automatically

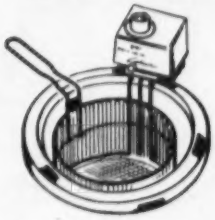
...PLUS These Accessories



New Handi-Raise Broiler for charcoal-like "steakhouse" results.



New Handi-Over Grill turns steaks chops, fish —easily, safely.



Plug-in Golden Fryer for better, tastier french fried foods.

Automatic Calrod Golden Griddle for the finest in griddle cookery.

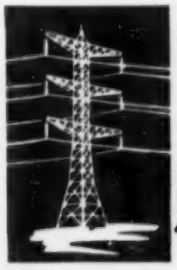
Let Your Customers Select The Deluxe Features They Want!

THE ACCEPTANCE of these medium-priced Hotpoint Ranges is a matter of record. Their popularity has never been equalled in Hotpoint history. And now Hotpoint creates an even greater demand for these volume models with a new "selling plus" that offers you an opportunity to broaden the market for electric ranges.

These Deluxe Range Accessories can be added singly or as a group—to make these Hotpoint ranges as deluxe as the customer wants. This versatility is easily demonstrated—and gives you a merchandising opportunity afforded by no other manufacturer.

Have your Hotpoint Distributor show you the "step-up" possibilities these Hotpoint Deluxe Accessories give you. They're proven sales-builders that help make the job of increasing your revenue easier!

Again, Hotpoint



looks at Tomorrow, Today!

HOTPOINT CO. (A Division of General Electric Company) **5600 West Taylor Street, Chicago 44, Illinois**

97 times more ozone-resistance in the new U.S. Royal Master High-Voltage Power Cable

***Amazingly* better than ANY of the 5 leading brands tested!**

Test A—Here, a sample of 5 KV unshielded U.S. Royal Master Power Cable was bent into a U-shape, roughly 8 times its overall diameter. Placed upright on a grounded metal plate, a conductor-to-plate potential of 40,000 volts was applied. Because of this high test potential, the air broke down—and ozone cracks appeared. All 5 competitive cables failed within 20 minutes to 35 hours. The U. S. Cable was still going strong after 3400 hours! That's *real* ozone-resistance!

Test B—A sample of the new U.S. B-18 ozone-resistant neoprene jacket was stretched 200% of its original length, clamped in a metal rack, and put in an ozone chamber... where the ozone concentration was adjusted to .025% to .030% volume. Five other competitive jackets taken from leading brands were likewise placed in the chamber. Within 2 and a half hours, all jackets had failed—EXCEPT "U. S." This jacket sample did not fail until after 18 hours' exposure!

PROVED BY TESTS

For full facts about the great high-voltage cable, call your nearest United States Rubber Company District Sales Office or write to address below. A representative will arrange to conclusively prove these facts.

US RUBBER

UNITED STATES RUBBER COMPANY
ELECTRICAL WIRE & CABLE DEPT. · ROCKEFELLER CENTER, NEW YORK 20, N. Y.

Own Construction Show Staged

First electrical construction and maintenance show ever to be held in San Diego on its own was staged in the Electric Building, Balboa Park, San Diego, Oct. 26 and 27 under the sponsorship of the Electrical Contractors of San Diego County, a division of the Bureau of Home Appliances. Likewise, the annual dinner meeting of this group was held Oct. 27 in the adjacent House of Hospitality Auditorium and the Electric Club of San Diego moved its meeting to Oct. 26 to lunch with the exhibitors and to visit the opening of the show.

Admission was by ticket only but was free to people involved in architectural planning, construction, financing, sales and maintenance fields in the electrical and allied industries. Previously the division held its show as an adjunct to the Bureau of Home Appliances' spring festival but this was for the general public. The construction and maintenance show was designed particularly for contractors, designers, engineers and architects and to show products applicable or new to construction and maintenance fields.

There were 39 manufacturers and their representatives who exhibited equipment.

"This is a first for San Diego," said C. J. Bunce, coordinator for the bureau, "as this show is a formal one, with its own building, space allocations by contract, etc."

Announced at the same time was the organization of a second class on certified lighting with 31 registered and a review session for all graduates of the first two series of classes which will be held after the first of the year. The reviews will be to clarify any problems likely to develop and to strengthen the participants' confidence and knowledge, as well as to strengthen the program. Backing up the activities of this division are television and direct mail campaigns with offers of the booklet "Residential Wiring Handbook." Between 150 and 200 requests come in weekly for this pamphlet.

Electric Club of Oregon places great value on its honorary memberships; has only granted five in its 26 years. Hence signal tribute to Berkeley Snow, executive manager, Northwest Electric Light & Power Assn., was paid on October 20 at a special ceremony to present Snow honorary membership and a plaque to signify it. President Harry F. Stengel, Bonneville Power Administration, made the presentation (center) to Snow (left) and Max Taylor, The Oregonian, was master of ceremonies that included an address, extolling the pioneer of the industry in Oregon, made by George C. Tenney, editor, Electrical West, San Francisco. An all-time record attendance of friends of "Berk" was on hand, too

NECA

Montana Chapter, NECA, had another successful quarterly meeting Oct. 8 in Helena. The main topic of discussion during the morning business session was the increasing pressure by general contractors to have all jobs bid under one general bid. The electrical contractors are considering a compromise bidding procedure and if this fails they plan to sponsor a bill in the next legislature calling for separate general, electrical and mechanical bids on all public works.

Contractors were present from Billings, Bozeman, Great Falls, Havre, Kalispell, Missoula and Helena. Members of the Montana Chapter, which has been without a full-time manager for more than a year, also decided to employ a full-time manager, which they hope to have before Jan. 1, 1956.

The afternoon program was entitled "Lighting for Profit," in which manufacturer and supplier representatives discussed the why, where, when and how of selling lighting. Those appearing on the panel were: Henry R. Huber, Benjamin Electric Mfg. Co., Seattle; Freeman Scharr, B. T. Hienz Co., Smoot-Holman and Silvray, Seattle; R. J. Delander, Sylvania Electric Products Co., Seattle; R. H. Howard, Monitor Distributors Inc., Butte; Stanley Englehardt, General Electric Supply, Butte.

IES

South Pacific Coast Illuminating Engineering Society regional conference for 1956, originally scheduled for April 15-17, had to be changed to April 11-13, Wednesday, Thursday and Friday, because of the inability to obtain hotel facilities on the original dates. The convention will be held at the Mark Hopkins Hotel on Nob Hill, San Francisco, with the Golden Gate Section as the host.

The Golden Gate Section held its Oct. 20 meeting at Mariani's Restaurant, Santa Clara, and then visited the Underwriters' Laboratories as guests of James MacNabb, electrical engineer. For the November meeting, a tour of the Prescolite plant in Berkeley and a program on residential lighting is being planned for Nov. 16. It was disclosed by W. A. Cyr, ELECTRICAL WEST, that this is the 35-year anniversary of the Golden Gate Section, it having been chartered in June of 1920.

Southern California Section will hear J. S. Hamel, consulting engineer, describe "Disneyland—The Illuminating Engineer's Viewpoint" at its Nov. 2 meeting and Charles D. Gibson is to be presented a certificate and emblem as a Fellow of the society.

San Diego Chapter held installation of its new officers, C. J. Bunce of the Bureau of Home Appliances, chairman, and S. V. Monsees, city of San Diego, secretary, at its Oct. 6 meeting. Mrs. Helen Eldridge, lighting consultant for California Electric Works, addressed the Ladies Night meeting, "Let's Decorate with Light." Charles A. Starr, designer of lighting equipment, was also on this program.

British Columbia Section, Vancouver, B. C., heard Lawrence C. Hanson, art director for Neon Products of

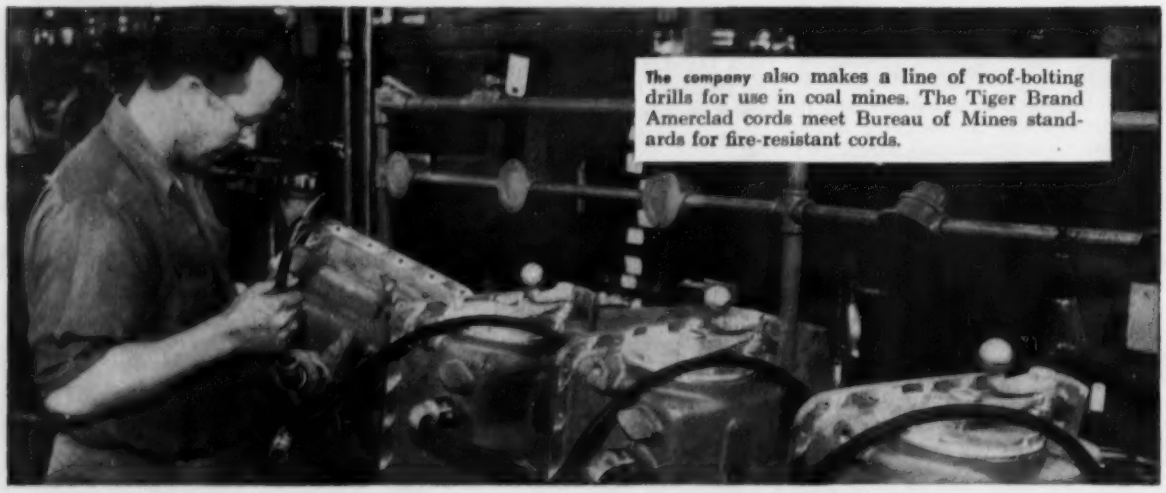
This company doesn't make so they equip the tools

THE TOOLS SHOWN HERE will never be used by a "do-it-yourselfer." They will not lie in a drawer to be operated once a week or so. Rather, they will see almost constant service in factories, garages and other businesses that need good tools because they use them hard.

And what a beating those cords take! They're stepped on, kicked, run over by lift trucks, kinked, dragged through oil and grease, flooded with water. But *these* cords match the quality of the tools themselves because they're Tiger Brand Amerclad.

The cord is a small part of the total cost of a tool. Can you afford to compromise with such an important accessory? Tiger Brand Amerclad Cords are made with the same techniques and care that go into our dependable high voltage power shovel and dredge cables. You *can* buy cheaper cords, but you *can't* buy better ones.

AMERICAN STEEL & WIRE DIVISION, UNITED STATES STEEL, GENERAL OFFICES: CLEVELAND, OHIO
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS • TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA., SOUTHERN DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK



The company also makes a line of roof-bolting drills for use in coal mines. The Tiger Brand Amerclad cords meet Bureau of Mines standards for fire-resistant cords.

A STANDARD TIGER BRAND CABLE FOR EVERY SPECIAL JOB

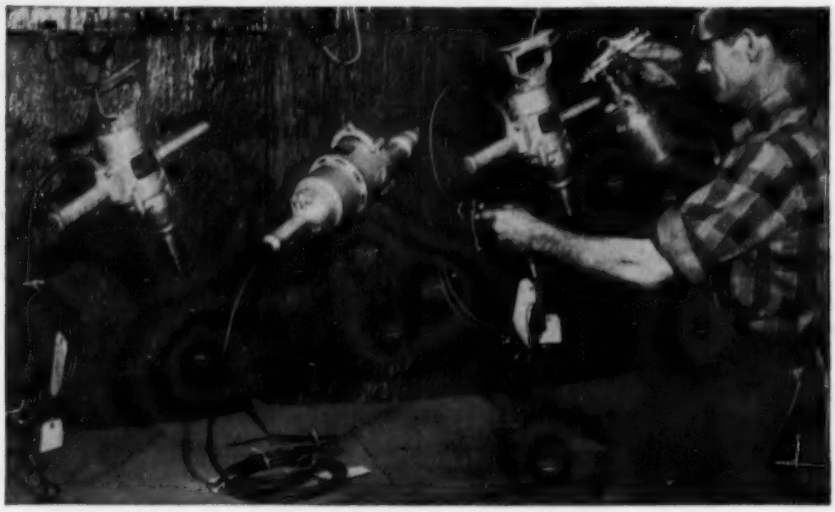
- asbestos wire and cable
- mold cured portable cord
- aerial, underground and submarine cable
- shovel and dredge cable
- paper and varnished cambric cable
- machine tool and building wire
- special purpose wire and cable

USS Tiger Brand ELECTRICAL WIRE & CABLE

UNITED STATES STEEL

a "cheap" line with *Tiger Brand Amerclad*

Every drill gets a 20-minute run-in test to check heat rise, speed and electrical soundness. The inspector reports that Tiger Brand Amerclad jackets never adhere to the insulation, a common and dangerous fault with lower quality cables.



This shows some of the higher capacity tools. Notice the strain relief jacket where cord emerges from tool. These drills are being sprayed with lacquer.

full 90° bend with one stroke of the ram . . . easy portability . . . extra versatility

Here's the kind of real portability you've been looking for in a bender for ½" to 2" pipe and conduit. Using light, but strong, aluminum alloy for many parts, the new GREENLEE No. 880 Hydraulic Bender is unusually *lightweight*, yet extra rugged, fast, powerful . . . produces 15 tons of ram force! One man can easily carry and operate it to quickly make uniform bends. Complete 90° bends can be made with one ram stroke. Separate two-speed hydraulic hand pump and bending ram simplify handling and setup. Easily operated by hand or may be teamed with a GREENLEE Power Pump for fast production jobs.

Attachments also available for bending thin-wall conduit, tubing, bus-bars. Get complete details on how to speed jobs and get better results with the new GREENLEE No. 880 Bender. Write for Bulletin E-217.

GREENLEE

GREENLEE TOOL CO.
1771 Columbia Ave., Rockford, Illinois

Doubling as member of San Francisco Board of Education, Charles Foehn, business manager, Local No. 6, IBEW, played host to the No. Calif. Chapter, IAEI, at John O'Connell Vocational School. Foehn, left, shows inspector group switchboard in electrical apprentice classes. Joseph E. Clisham, center, coordinator of trade and industrial education

Western Canada Ltd., discuss application and design of outdoor electric displays at its Oct. 20 meeting. J. MacCarthy of B. C. Electric Co., agricultural specialist, was scheduled to talk on "Lighting on the Farm" at the Nov. 17 meeting.

San Jose Chapter, IES, heard Dan Weisser, new illuminating engineer for G-E Lamp Division, Oakland, address "New Developments in Lamp Design" at the Oct. 19 meeting in San Jose.

Oregon Section at its Oct. 19 meeting had an interesting panel discussion "What Should IES Do for Me?" with Donald Edmundson, architect, as moderator; T. W. Fitch, Portland General Electric Co., utility representative; Dudley D. Moore, Benjamin Electric Mfg. Co.; R. D. Kennedy, architect; Ray Preston, consulting engineer; and Earl Webb, Webb Mfg. Co., equipment manufacturer, to present views. Jerry Miller was chairman of the program.

Puget Sound Section, IES, heard Robert G. Hess, chief electrical engineer for John Graham Co., architect and engineer, discuss the design of a modern shopping center at its Oct. 5 meeting in Seattle. A report on the IES national technical conference was

Next Year's Meetings—1956

February

6-10—**Winter Market**, Western Merchandise Mart, San Francisco

March

22-23—**Pacific Coast Electrical Assn., Engineering and Operating Section**, Sheraton-Palace, San Francisco

April

5-7—**Electrical Maintenance Engineers of So. Calif., Industrial Show**, Shrine Auditorium, Los Angeles

11-13—**Northwest Electric Light & Power Assn., Engineering and Operating Section**, Hotel Vancouver, Vancouver, B. C.

11-13—**Institute of Radio Engineers**, regional conference, Hotel Utah, Salt Lake City

11-13—**Illuminating Engineering Society**, South Pacific Coast Region conference, Hotel Mark Hopkins, San Francisco

17-18—**PCEA, Administrative Services Section**, Sheraton-Huntington, Pasadena

19-21—**IES**, Pacific Northwest Region conference, Davenport Hotel, Spokane

26-28—**IES**, Intermountain Region conference Hotel Utah, Salt Lake City

May

3-5—**National Electrical Contractors Assn.**, District 6 & 8 conference, Hotel Utah, Salt Lake City

14-16—**PCEA**, annual convention, Las Vegas

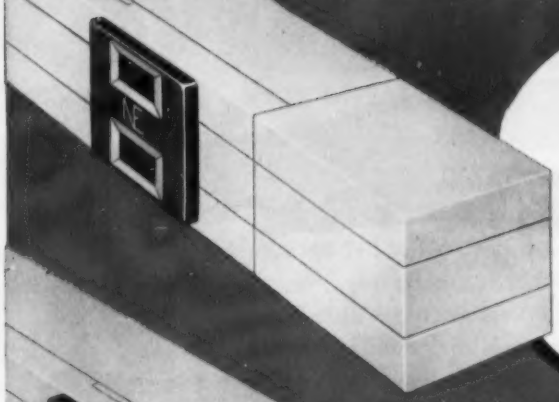
21-23—**NWEL&PA, Business Development Section**, Benjamin Franklin Hotel, Seattle

June

25-29—**American Institute of Electrical Engineers**, summer and Pacific general meeting, San Francisco

Plenty of outlets...FAST

WITH NATIONAL ELECTRIC "PLUG-IN" STRIP



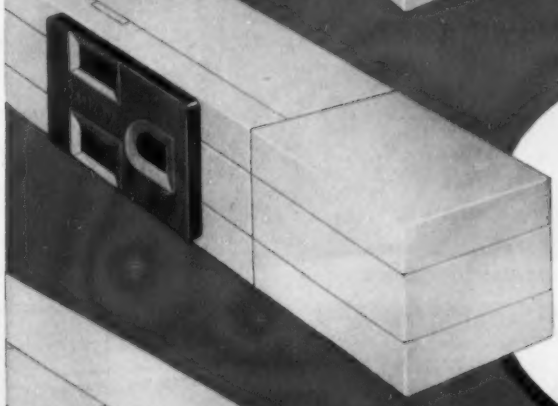
TYPE CF-2

"PLUG-IN" STRIP

FOR CONSTANT SERVICE

Constant Service 2-wire type CF-2 "Plug-in" Strip has been a standard of the electrical industry for many years. This steel enclosed pre-wired multi-outlet assembly is ideal for applications where a spread of outlets is required to provide safe, dependable, convenient electric service.

Available with outlets spaced every 6 or 18 inches.



TYPE CF-2G

"PLUG-IN" STRIP

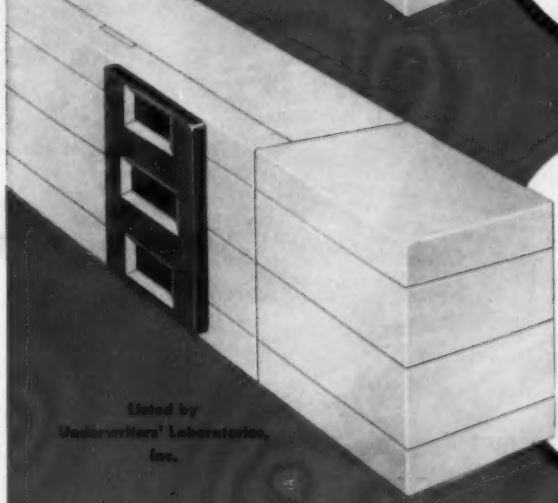
FOR GROUNDING AND SAFETY REQUIREMENTS

Type CF2-G "*Plug-in*" Strip provides a spread of convenient receptacles for the use of grounded equipment.

The dual-service receptacle accommodates either grounded or ungrounded equipment.

The grounding insert of each receptacle is positively secured to the all-steel raceway providing a continuous metallic ground the entire length of the "Plug-in" Strip.

Available with outlets spaced every 6 or 18 inches.



Listed by Underwriters' Laboratories, Inc.

TYPE CF-3

"PLUG-IN" STRIP

FOR WALL SWITCH CONTROLLED SERVICE

National Electric's 3-wire "Plug-in" Strip provides full switch-controlled residential service with a minimum of switch leg wiring. Two distinct electrical services are provided in each receptacle. Every receptacle has both switch-controlled and constant service features . . .

A choice of service every 18 inches.

NATIONAL ELECTRIC PRODUCTS CORP. 50TH ANNIVERSARY 1905–1955

National Electric Products

TORRANCE, CALIFORNIA

Branch Offices: San Francisco • Seattle • Denver • Los Angeles
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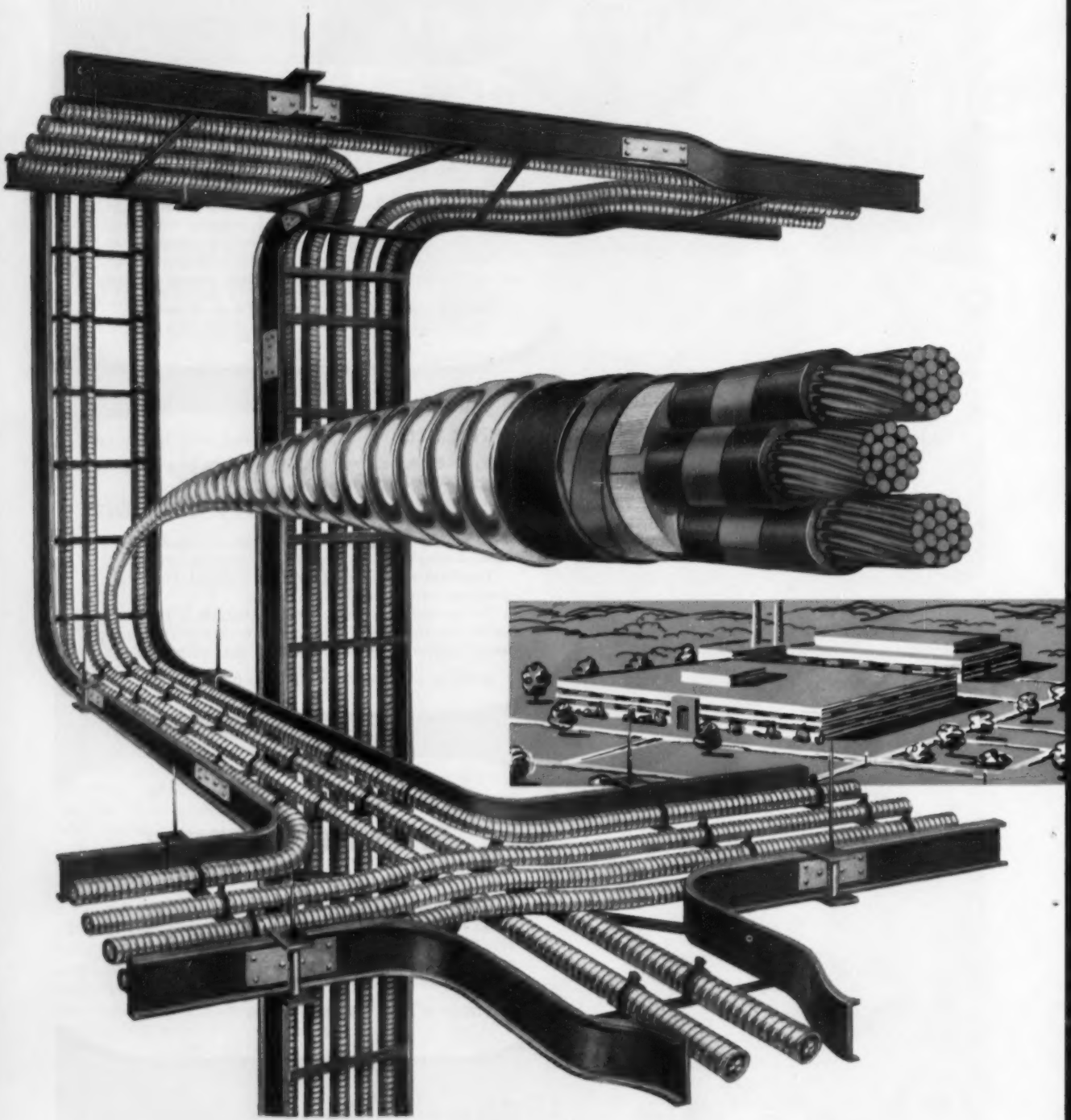
PHELPS DODGE



varnished cambric insulated

ARMO-LOK CABLE

An efficient, dependable system of power distribution for industrial plants and utilities

ARMO-LOK is Phelps Dodge's interlocked armor cable developed to replace cable in conventional conduits and underground ducts for industrial plants, power stations and similar applications. This "cable-in-air" system is made up of ARMO-LOK power and control cables, a fully coordinated line of terminators, straight and branch joints and junction boxes. Installed on racks, in baskets or in troughs, it presents a neat, streamlined appearance.

ARMO-LOK has a number of operating advantages including:

1. Lower cost—due to elimination of expensive underground ducts and overhead conduits and reduction in conductor size.
2. Fast, easy repairing—no long delays in restoring service; repairs can be made without removing cable from racks, baskets or troughs.
3. Adaptability—cable is easy to move whenever changing circuits; new circuits are also easily added.
4. Smaller space required—savings of up to 50% and more over conventional conduit systems.

ARMO-LOK is also supplied with Habirite (butyl rubber) insulation. For applications where acids, alkalis and other corrosive conditions exist, ARMO-LOK is available with special Phelps Dodge over-all jacket of PVC plastic.

See your Phelps Dodge distributor for information on a complete ARMO-LOK system, including cable, racks, splices and all necessary fittings! For catalog and specification data, write Dept. W, Phelps Dodge Copper Products Corporation, 300 Park Ave., New York 22, N. Y.

PHELPS DODGE COPPER PRODUCTS CORPORATION

SALES OFFICES: Atlanta, Birmingham, Ala., Boston, Buffalo, Charlotte, Chicago, Cincinnati, Cleveland, Dallas, Detroit, Fort Wayne, Greensboro, N. C., Houston, Jacksonville, Kansas City, Mo., Los Angeles, Milwaukee, Minneapolis, New Orleans, New York, Philadelphia, Pittsburgh, Portland, Ore., Richmond, Rochester, N. Y., San Francisco, St. Louis, Seattle, Washington, D. C.

HERE'S SAFETY—SERVICE

you can always depend on. For Klein tools and equipment are designed better for your jobs—made of the finest materials—individually tested and inspected. Look for the familiar Klein trade-mark—serving the electrical industry "since 1857."

ASK YOUR SUPPLIER

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Write for your free copy of the Klein Pocket Tool Guide Today!

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also heard from Ken Hollingsworth and Ken Dean, who had attended the Cleveland convention.

Inspectors

Utah Chapter, International Association of Electrical Inspectors, discussed both the Spokane 200-amp ordinance and Salt Lake City's new ordinance effective Sept. 1, requiring the installation of 1½-in. conduit for EMT on all service entrances for residences of 1,500 sq ft or less with No. 2 conductors; for 1,500-sq-ft residences 1½-in. conduit or EMT and 1/0 copper is required. Likewise, convenience outlets are required on 12-ft centers and range circuit and receptacles are to be standard for all residences. L. M. Christensen, the electrical inspector, explained that remodeling and renovation projects would be considered as individual problems but as a general rule changes in metering or service equipment would be sufficient to require new standards for service entrances.

Northern California Chapter met at the John O'Connell Vocational Trade School, San Francisco, for its Oct. 5 meeting. Chester Hefner acted as chairman in the absence of Del Hanson of Oakland. George Kimball, retired, former supervising engineer of the California State Division of Industrial Safety, was presented a certificate of honorary membership in IAEI. The packaged General Electric kitchen with a 12-circuit load center in it came up for considerable discussion since inspectors had objected to having lighting circuits as well as the kitchen and appliance circuits in this location so near the Disposall. Representatives of Trumbull Components Division, G-E, explained that the 1956 models would have only an 8-circuit load center for the kitchen units alone. Whether to require or not cords and plugs for disconnecting built-in kitchen units was likewise discussed. Problems of grounding the wire system where plastic pipe is used or nonconducting inserts in the water system prevent continuous bonding and the recent hearings by the Public Utilities Commission on the subject resulted in the appointment of a committee to study the problem and to make the inspectors' point of view clear to the commission. Tests of the diffusing media for luminous backgrounds and ceilings by Underwriters' Laboratories for fire travel, fall out, fire hazard and toxicity were described by representatives of the laboratories. A tour of the trade school was made under the direction of Charles Foehn, a member of the San Francisco Board of Education as well as business manager of Local No. 6, IBEW, and Joseph E. Clisham, coordinator of trade and industrial education.

Rescued from

graveyard by

G-E Service Shop

Get your obsolete distribution transformers back on the pole again—as good as new! Just call your local G-E Service Shop. We'll rebuild them ...uprate them 40% or more ...and return them with new-transformer warranties. There are 31 G-E Service Shops throughout the country—one near you. 431-51

Progress Is Our Most Important Product

GENERAL ELECTRIC

A TOAST TO THE FINEST LIGHTING—ANYWHERE!

Here's to another fine example of store lighting — Desmond's of Pasadena, California. Various Sunbeam Visionaires® were specified and installed to achieve a balanced, high-intensity, low-brightness illumination for maximum sales appeal and customer comfort. Sunbeam's 4' x 4' recessed "large area" HL3800 series was selected for its contemporary design and efficient, minimum glare lighting. Recessed incandescent units with square prismatic lenses were used in the sales areas for warm tone accents. Indirect cove lights give added emphasis to display areas. Here's also to architect H. J. Nicolais, A.I.A., of Burke, Kober and Nicolais and to M. J. Garris, E. E., for a highly successful store design and lighting installation.

SUNBEAM visionaire

SUNBEAM LIGHTING COMPANY, 777 E. 14TH PL., LOS ANGELES 21, CALIFORNIA

THE MONTH IN BRIEF

High Court Denies Condemnation

The Montana Supreme Court has ruled against condemnation of property needed for the site of Noxon Rapids Dam by Washington Water Power Co. Construction will not be delayed by the action. The court set aside a lower court approval of condemnation of land owned by William F. and Myrtle Martin because WWP posted no security costs.

Safety Award Earned by Edison

Southern California Edison Co. has received the EEI Safety Merit Award for completing more than 1,350,000 man-hours without a disabling injury. Commented President Harold Quinton, "Edison is very proud of its safety record, which has been made possible by continuous and vigilant efforts toward safety by every member of the company."

Two-State Water Fight Stalled

Hopes for an earlier settlement of the Arizona-California Supreme Court fight for Colorado River water were dashed with the death of George I. Haight, 77, of Chicago, who was a special master appointed by the court to prepare recommendations in the suit. He had been conducting hearings for several months and died shortly before a pretrial conference to be held at Carson City. A new special master must be appointed.

Changes Due in Interstate Compact

Members of the Columbia Interstate Compact Commission have agreed that many changes in the compact are likely. Originally including seven states, the compact may be narrowed to include only Washington, Oregon, Idaho and Montana. Wyoming, Utah and Nevada may continue their affiliation in some form. Charles R. Savage, commission member, urged at the Seattle meeting that the agreement be broadened so the commission could take over Grand Coulee, Bonneville and other government power projects as the federal investment is repaid.

Chudoff Will Not Hear Utilities

The House government operations subcommittee, headed by Rep. Earl Chudoff, Pennsylvania Democrat, voted not to hear arguments from private utility companies in the current "investigation" of Interior Department power policy. During the committee's September tour through the West, Chudoff said the private companies would be given a chance to present their testimony at Washington hearings. Republican members of the committee have repeatedly stated their suspicions that the "investigation" is nothing but a propaganda-gathering mission for political purposes. Only those with complaints against the Interior Department have been heard, except Pacific Gas and Electric Co. representatives and Dr. William A. Pearl, Bonneville power administrator.

Corps to Resubmit John Day Change

John Day Dam data, including a proposal to lower the height of the dam, will be resubmitted to the Corps of Engineers Board of Review, with plans to regain flood control storage by development of the Clearwater River and the Bruces Eddy and Penny Cliffs sites. The proposal to lower the dam was refused by the board until additional flood control storage was provided. The higher dam would inundate several small Oregon towns and expensive land.

Upper American Plan Feasible

Two Pacific Coast bond houses have declared the plan of Sacramento Municipal Utility District to finance the Upper American River water and power development with revenue bonds is financially and economically feasible. The revenue bond issue will be voted on Dec. 6. Blyth & Co. and Stone & Youngberg drew up the report. Cost of the project will be about $85,000,000.

Charter Election Slated in Tacoma

The Tacoma city council has scheduled an election for Feb. 14 on adoption of a new city charter that would revise administration of municipal utilities and public works. The mayor would appoint the heads of the major utility departments, including City Light, under the new charter. A utilities board and director appoints now.

PUD Turns Down City's Partnership

Grant County PUD, Ephrata, Wash., has notified Ellensburg officials there is "no possibility of the PUD and the City of Ellensburg becoming partners in construction and operation of the Priest Rapids power project." Mayor Virgil West replied that Ellensburg "is not interested in buying power from the Priest Rapids project on a contract basis." Ellensburg has proposed partnership development in answer to invitations from the PUD when the project was proposed last year. The PUD now hopes to sell the power to members of the Puget Sound Utilities Council and develop the project alone.

Colorado-Ute Faces Power Shortage

Western Colorado Power Co. has notified four southwestern REA cooperatives it will be unable to supply them with all their anticipated kilowatt needs in December. Involved are Empire Electric Assn., Delta-Montrose Rural Power Lines Assn., La Plata Electric Assn. and San Miguel Power Assn., who are the Colorado-Ute Electric Assn. The group was formed to finance an REA generating station to be operated by the private company. James A. Bullock, general manager of Western Colorado, notified the co-ops that generating capacity was not adequate to meet all needs for December. Western Colorado presently supplies wholesale power to the co-ops from its own facilities.

Connect 'em for keeps ...with compression

KEARNEY SQUEEZONS

Exclusive "built-in-spacer" Prevents Strand-Cutting

The conductors can't be mashed together in a SQUEEZON connection. KEARNEY's exclusive "built-in spacer" design holds each conductor individually, gripping it around its entire circumference. Strand-cutting, pinching or any other kind of distortion is prevented.

Also, this "built-in spacer" provides the metallic mass necessary to prevent and withstand electrolytic action . . . even in bi-metallic connections.

Time-saving, trouble-saving KEARNEY SQUEEZONS are available in types and sizes for all types of above-ground distribution connections. They are applied in a minute with either a hydraulic or mechanical tool.

JRK 285W

For Better Construction . . . Safer Maintenance

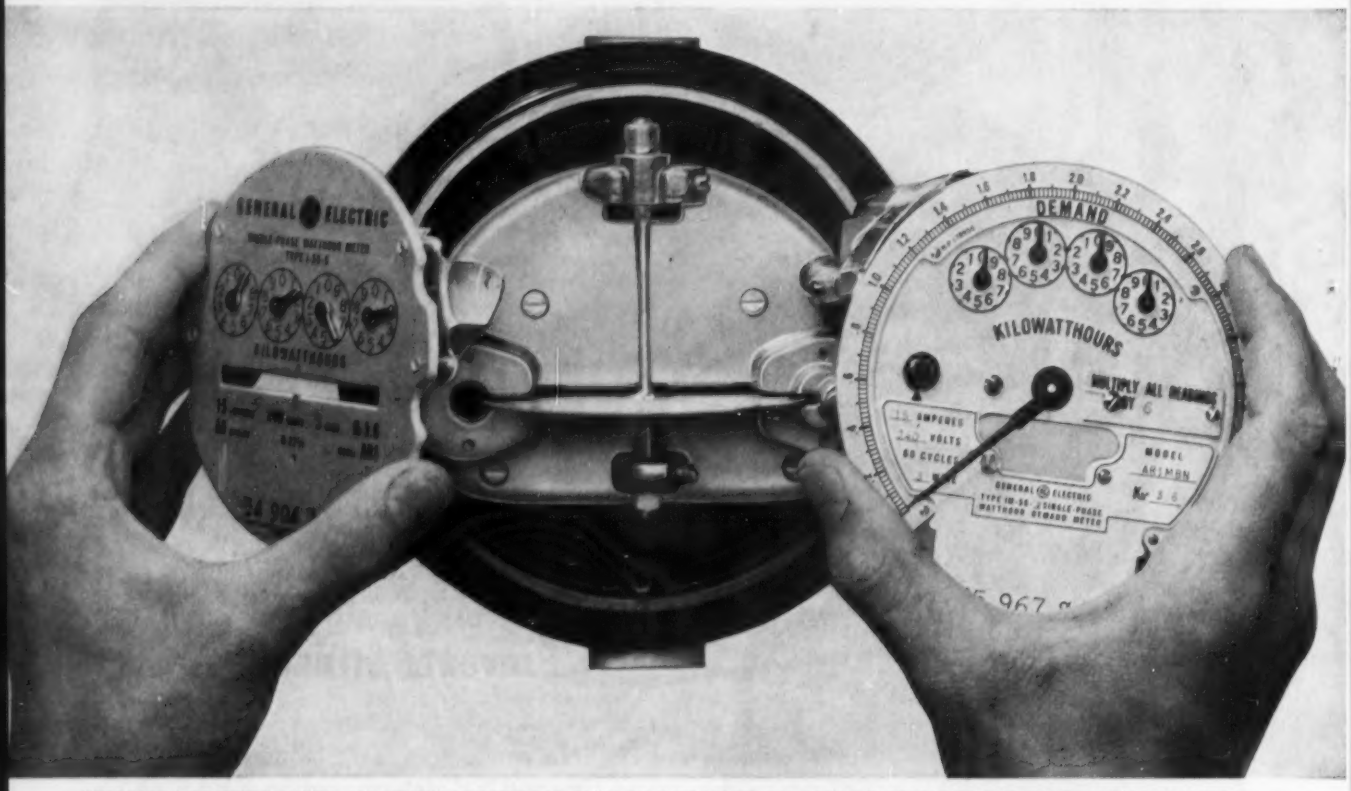
JAMES R. KEARNEY CORPORATION ST. LOUIS, MO.

Specify KEARNEY PRODUCTS

The Mark of Quality

MAYDWELL & HARTZELL, *INCORPORATED* • WEST COAST DISTRIBUTORS • Los Angeles • San Francisco • Portland • Seattle • Spokane • Phoenix

DEMAND METERING



DEMAND REGISTERS OFFER MAXIMUM FLEXIBILITY, MAY BE INSTALLED ON ANY G-E SINGLE-PHASE OR POLYPHASE METER

Demand Registers: The Most Reliable Means to Low Cost Demand Metering

- Increasing number of utilities are taking advantage of the benefits offered by demand registers
- Flexibility of register assures reduced inventory and operating costs
- Greatly reduced testing and maintenance expenses have resulted from improved designs

The dependable low-cost operation of mechanical demand registers has led to their increasing acceptance by the utility industry.

General Electric engineers have released test results which give assurance of increased reliability of demand registers. These tests show that the life of the register rotor has been extended up to 10 years. This fact means that the register will need testing and maintenance only during periodic meter tests. This assurance of dependable performance offers the utilities unlimited savings in their demand metering operation.

DIRECT GEAR DRIVE . . . Not only is the register on the same testing basis as the meter but also the demand register possesses the same stability of calibration as the watthour meter. This high degree of accuracy remains unchanged during life, and thus assures reliable operation for years. In comparison with other types of demand metering devices, the register is relatively unaffected by such variables as friction and climate.

REGISTER FLEXIBILITY . . . The versatility of design of General Electric's demand register offers the opportunity of converting the register to different scale classes, different electrical ratings, or any

available time interval. Standardization on one register ratio with a change in only the multiplier is but one of the many cost-saving methods which is available with only a demand register.

REDUCED INVENTORY . . . The opportunities for reduced inventory are unlimited with the use of demand registers. Any stock single-phase or polyphase watthour meter can be converted to a demand meter merely by substituting a demand register. This adaptability which results in reduced inventory and operating costs is unique only with demand registers.

IN SERVICE . . . A watthour meter can be readily converted to a demand meter simply by the interchanging of registers. Also, quick, easy, accurate and low-cost field testing can be realized with demand registers. With the use of a G-E self-checking adapter, the need for elaborate testing equipment and costly hours of labor is eliminated.

These facts offer you the greatest possible assurance that General Electric's demand registers are your most reliable means to low-cost demand metering.

MANY UTILITIES . . . Increasing numbers of utilities are taking advantage of the benefits offered by demand registers. Here are but a few: Commonwealth Edison Company, Wisconsin Electric Power Company, Kansas Power and Light Company, Duke Power Company, Pacific Gas and Electric Company, Southern California Edison Company, Public Service Company of Oklahoma, and New Orleans Public Service Inc.

FOR MORE INFORMATION . . . If you would like more information on General Electric's mechanical demand registers, write to Section 621-12, General Electric Company, Schenectady 5, N. Y.

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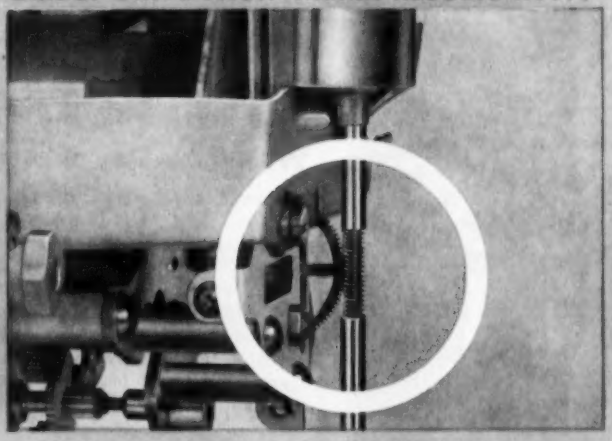
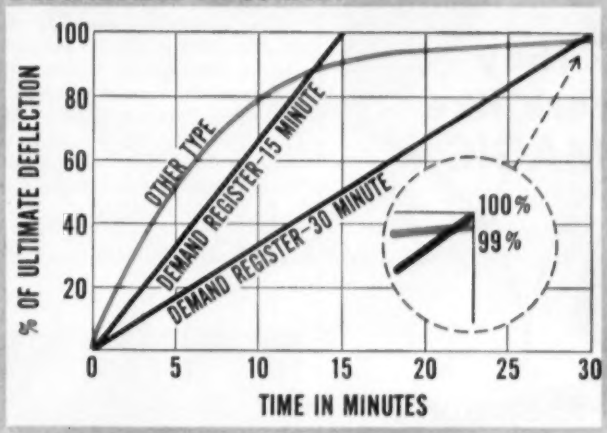
DIRECT DRIVE FROM METER RESULTS IN . . .



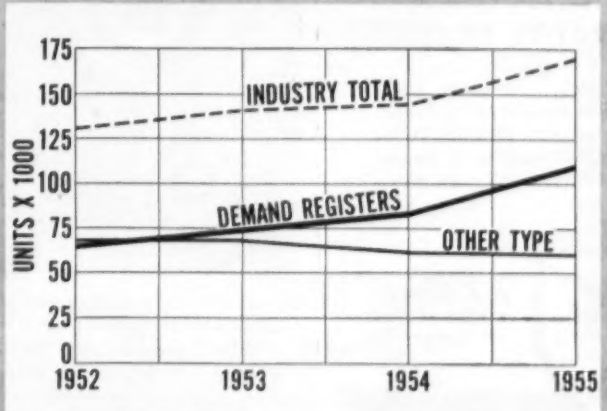
DIRECT GEAR DRIVE from the meter assures sustained accuracy for years.

DEPENDABLE ACCURACY



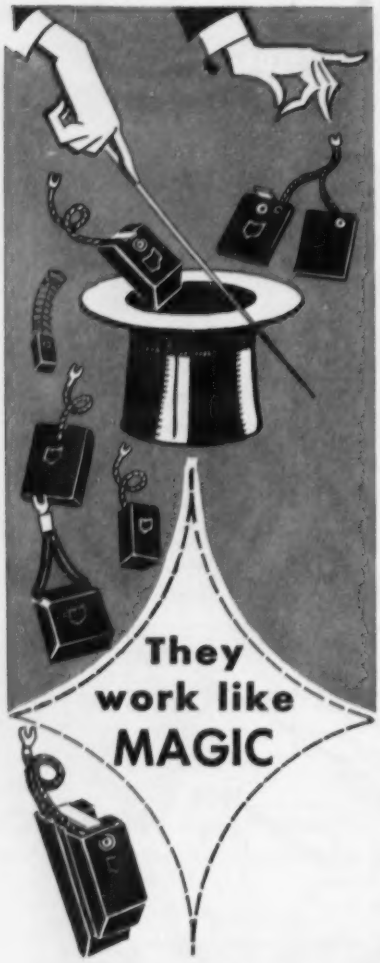
ONLY REGISTERS reach 100% of average demand after rated time interval.

INCREASING UTILITY USE



INCREASING USE of demand register results from dependable operation.

With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities.



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THIS MONTH'S NEWS

308 Review Launched With Two-Day Meeting

Review of the 308 Report of the Corps of Engineers was launched recently with a two-day meeting of the advisory committee in Portland. The report is a guide for development of Columbia Basin water resources.

At the orientation meeting it was revealed that several plans for supplementing hydroelectric power with conventional steam and nuclear generating facilities will be considered. Power systems using various combinations of different generating methods will be studied. Atomic Energy Commission aid has been requested for the review.

One committee member predicted that by 1975 it will no longer be possible to develop new hydro power that is cheaper than steam power.

Gordon Fernald, head of the corps planning branch, noted that what Canada does with the Columbia flow "may materially affect the Columbia basin development on this side of the border."

Advisory committee members represent Corps of Engineers, Bureau of Reclamation, Bonneville Power Administration, Federal Power Commission, U. S. Department of Agriculture, and public and private power interests.

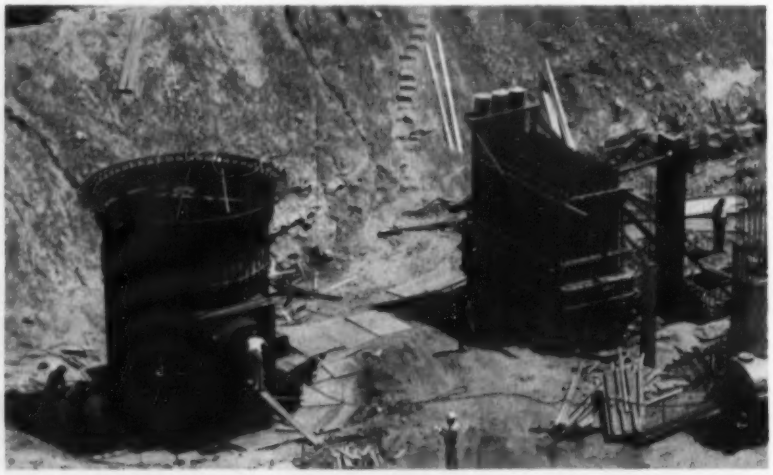
The review was authorized by Congress with the stipulation that the hydroelectric power potentialities be studied as part of a combined hydrothermal system.

Douglas PUD Ends Suit For Puget Sound's Dam

Douglas County PUD, Bridgeport, Wash., has agreed to drop condemnation suits against the Rock Island Dam of Puget Sound Power & Light Co., after a conference with Chelan County PUD commissioners.

Chelan PUD agreed to supply the neighboring Douglas organization 60,000 kw of power from Rocky Beach project, if and when it is completed, in return for withdrawal of the suits.

Chelan PUD has six generators in the Rock Island power house under an agreement with Puget Sound.



Construction on the sodium graphite nuclear reactor being built by North American Aviation Inc. for the Atomic Energy Commission is underway. The site is about 30 miles northwest of Los Angeles on Santa Susana Mountain. AEC has invited proposals from organizations interested in purchasing the 20,000 kw of heat that will be produced by the reactor and has received an offer from Southern California Edison Co. Public power organizations in the vicinity have announced publicly they will not offer to purchase the heat, since unclassified information gained from the experiment will be made public. The heat would be used through heat exchangers to generate about 7,500 kw of electricity. North American, looking toward potential world market for commercial nuclear reactors, has established Atomics International as a separate division for nuclear engineering-manufacture. Pictured at the left in the photo is the core cavity liner for the experimental reactor

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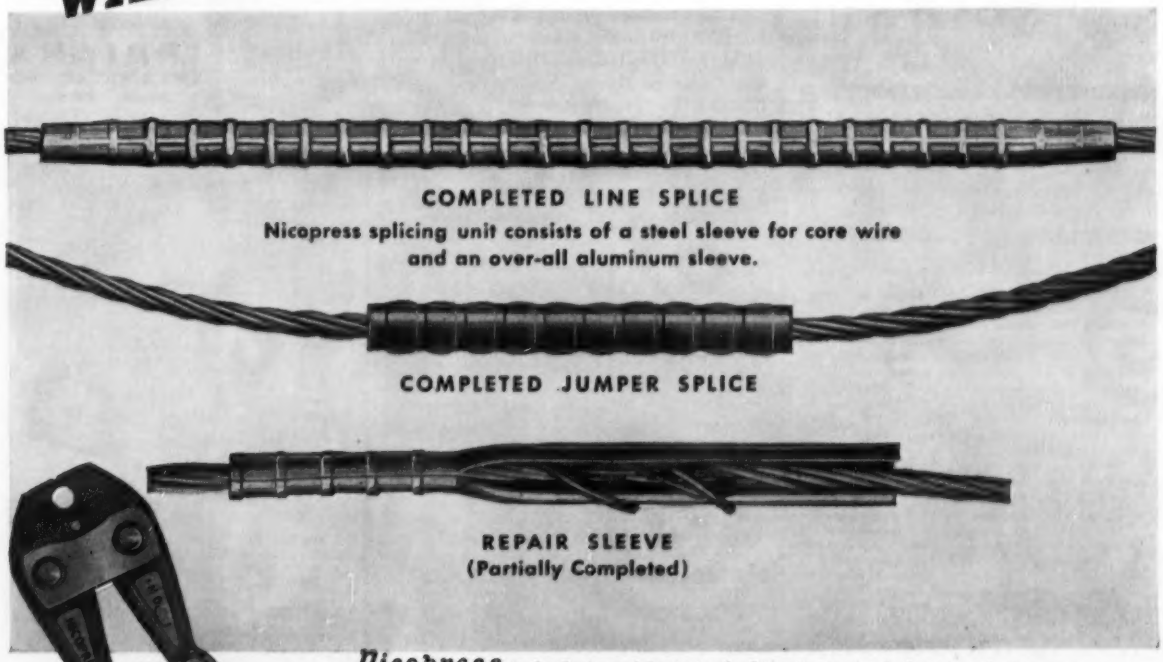

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Nicopress splicing unit consists of a steel sleeve for core wire and an over-all aluminum sleeve.

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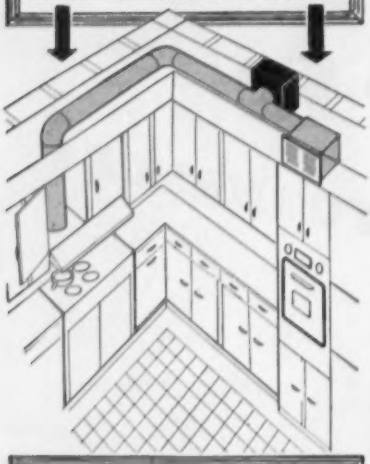

No need to install Two Kitchen Exhaust Fans

SEPARATE Range and Oven are an important improvement in the modern kitchen that already has received nation-wide approval. For the complete ventilation of both cooking units, a satisfactory volume of air movement is assured by the No. 11 BROAN MOTORDOR Kitchen Exhaust Fan with Duct connection to both the BROAN No. 24 Adapter (over the oven) and Hood Exhaust (over the range).

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Installation is simplified, for only 7" round furnace-pipe is required to connect the MOTORDOR Fan, in the outer wall, to both Adapter and Grille in Soffit or Ceiling, over Oven and Range Hood.

The MOTORDOR Fan "pulls" the air through the duct, instead of "blowing" it, and thus eliminates pressures at turns. The insulated, weather-proof, motor-operated outside door of the fan — with sponge-rubber seal — provides perfect protection against weather, condensation, freeze-ups, back-drafts and insects. There is no damper to rattle on windy days, no annoying fan noise in the kitchen.

FREE . . . complete directions for suggested installations of a single BROAN MOTORDOR Fan to ventilate BOTH RANGE AND OVEN in any kitchen, forwarded promptly. Send today. Address:

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FPC License Sought For Upper Baker Dam

Puget Sound Power & Light Co. has applied to the Federal Power Commission for a license to build an 85,000-kw hydroelectric plant on the upper Baker River in Washington.

The proposed dam, about 300 ft high, would be located about eight miles above the company's present Baker River project and would impound approximately 238,000 acre-ft of water to give greater control of river flow.

Additional generating capacity amounting to 55,000 kw will be installed in the Lower Baker station bringing the total to 140,000 kw at an estimated cost of $35,000,000.

Plans call for a start of construction as soon as weather permits next spring, with completion scheduled for 1959.

Tacoma's Cowlitz Case Goes to Supreme Court

Tacoma taxpayers can participate in a court action against Tacoma City Light's proposed construction of a $134,000,000 hydroelectric project on the Cowlitz River. Superior Judge Charles T. Wright reversed an earlier decision to excuse taxpayers, and appointed Jack Lynch, an Olympia attorney, to represent them.

The court action is being brought by state game and fish departments.

Because the recent action of Judge Wright caused a delay in the trial, attorneys for Tacoma City Light are taking the case directly to the state supreme court, rather than wait for a verdict from the lower court.

In the meantime, work is under way on Mayfield Dam, the first of two in the project, despite the fact that the court granted a temporary injunction against construction.

Rate Increase Asked By Southern Nevada Co.

Southern Nevada Power Co. has petitioned the State Public Service Commission for a rate increase averaging 14%.

Credited with causing the request was the withdrawal of 38% of the company's supply of Hoover Dam power, which in turn caused the company to launch a construction program that will cost about $20,000,000 in the next two years and to pay twice as much for replacement power.

It is the first rate increase asked since the company began serving Las Vegas in 1906.

INDIANA STEEL & WIRE CO. MUNCIE, IND. Crapo Galvanizing

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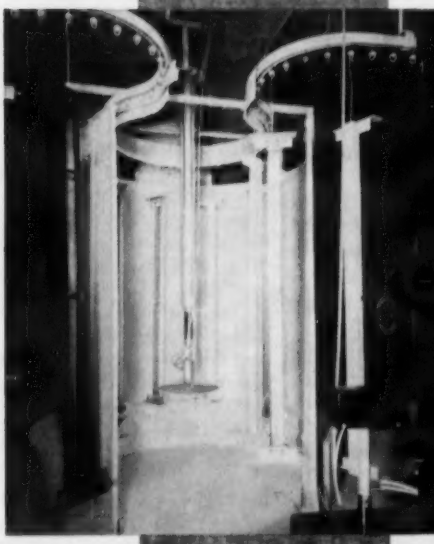

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THREE PLANTS TO SERVE THE WEST

John Day Bill Debated Before Oregon People

Reports from eastern Oregon indicate that Republican Rep. Sam Coon and Democrat Sen. Richard Neuberger, opposing each other in a series of 10 debates on the John Day bill, probably did not influence public opinion much on the bill but spread more understanding of partnership development in general.

An estimated 6,500 people witnessed the debates personally and many more were able to follow them by means of extensive radio, newspaper and television coverage.

Debating the question, "Agreed the John Day Dam Bill IS in the Public Interest," the two men faced audiences in Hood River, The Dalles, Pendleton, La Grande, Baker, Ontario, Burns, Lakeview, Klamath Falls and Bend.

Observers gave two rounds, Hood River and Klamath Falls, to Congressman Coon and one round, Pendleton, to Senator Neuberger. Neither scored any apparent advantage at the other seven cities, but Representative Coon received a better press in most cases.

Coon, speaking the language of his own home territory, offset the polished performances of Neuberger many times by (1) sticking to the debate question and (2) his sincerity and honest conviction. Neuberger seldom spoke directly on the John Day bill and used the debates to make many claims in favor of federal power projects and against private utilities.

Both men were credited with convincing audiences of a major point each. Neuberger successfully sold the idea that the cost of John Day power under the partnership plan would be higher than if it were developed by the federal government alone. Coon effectively pointed out the impending power needs of the region and the way partnership development provides a certain method of financing expansion as compared with uncertainty in securing congressional appropriations.

Coon

". . . it seems to be more apparent every day that members of Congress, members of both parties, from other sections of the country, show a growing resistance to appropriations for the Pacific Northwest."

Affirmative

Rep. Sam Coon explained in his opening talk at Hood River that John Day Dam would be a navigation, irrigation, and flood control project, with an initial installed hydroelectric power capacity of 1,105,000 kw.

His bill would allow local contribution of $273,000,000 of the estimated $310,000,000 total cost through the sale of electricity to the private or public agencies participating. The federal government would pay the nonreimbursible parts of the cost and would own the dam at the end of 50 years.

Local interests would also pay their proportionate share of operating and maintenance costs, he said, which includes maintaining fish-passing facilities.

"There are three ways we can raise the money we need," Coon stated. "We can raise taxes. We can increase deficit spending, which will raise the national debt, or we can use money provided by local interests, as projected in my John Day proposal."

He stated that his bill provides a way to get the dam without taxes or raising the national debt, "and that certainly is in the public interest. A lack of power is not in the public interest."

"This plan has been used over the last 47 years. This type of cooperation has been used as far back as 1908 and has been used successfully. The John Day Bill . . . can be more successful."

Who Did What?

Sen. Richard Neuberger told an audience, referring to the prior Cordon-Coon bill of 1954, that "by delaying the bill a year Senator Morse and I forced them to hike their (private utilities) offer by $109,000,000."

Rep. Sam Coon drew a laugh from the audience when he reminded the Democrat senator that he wasn't in the senate yet in 1954.

Neuberger

". . . water power is our principal natural source of fuel, the cost of generating with it is of prime importance. With the rate of power doubled . . . the demand for dams would decline . . . the companion benefits with it."

Negative

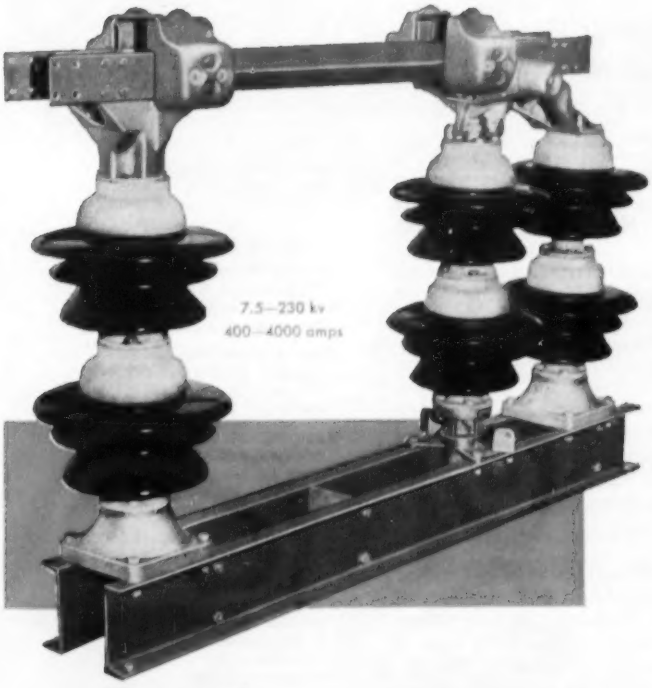
Sen. Richard Neuberger said there are "two big reasons" why power would be more expensive from the "partnership" construction proposed by the John Day Dam bill introduced by Coon.

"First," he said, "the private companies pay a higher rate of interest on money borrowed for construction than does the federal government. For each 1% in the interest rate charged for use of money to erect a great project like John Day, the cost of power goes up 13%.

"Second, the price of power from federal projects is decided by averaging in the cost of every government power unit in the system. Since all the partnership power would go to private companies, its cost could not be blended in with the kilowatts from such dams as Bonneville and Grand Coulee, which have better sites and were built when prices were low. If future dams are erected under high-cost partnership schemes, what, then, happens to the Northwest's natural advantage over other regions in the form of cheap hydroelectricity? Who would really benefit from the partnership plan?"

He said, ". . . the retail value to the companies of John Day power would be about $100,000,000 a year." He said that, over 50 years, the utilities would pay $273,000,000 for power retailing for about $5,000,000,000.

CITY OF SEATTLE CHOOSES SOUTHERN STATES TYPE WAG SWITCHES FOR SUBSTATIONS



One of the nation's leading municipals, the City of Seattle, Department of Lighting, last year equipped its Shoreline Substation with twelve 115 kv - 1200 amp WAG switches. Recently, forty 34.5 kv - 1200 amp WAGs and two each of 3,000 and 4,000 amps were installed at the Duwamish Substation in South Seattle.

Today, extra care must be given to the choice of air break switches, because increased generating capacity and a higher degree of integration bring corresponding increases in short circuit capacities.

The Type WAG is designed to carry full-rated continuous current indefinitely and to withstand maximum short circuits. Self-cleaning, high pressure line contacts with greater deflection, shuntless design, and simplified mechanical linkage assure adequate performance—even under the most adverse conditions, including icing.

Other features that cause increasing numbers of utilities to use Type WAG Switches are: double-race, greaseless bronze ball bearings; oilite sleeve bearings; simplified design; no maintenance; and rugged, high-quality construction throughout.

Careful study will show why it will pay you to use Type WAG Switches. For additional details, write us for Bulletin 390-R.

SOUTHERN STATES EQUIPMENT CORP.
HAMPTON, GEORGIA

IN CANADA: Dominion Cutout Co., Ltd., Toronto

This farmer-owned and operated ferry assisted with the crossing of the Colorado River

Latter Day Pioneers Farm Cibola Valley

Westerners are nearly always interested in tales about pioneering for the logical reason that most of them are either pioneers or descendents of them.

From Arizona comes the story of a group of modern settlers who moved into the Cibola Valley and cleared away salt cedar and other flood-land vegetation to make 6,000 acres productive. It's true that they used trucks instead of Conestogas and bulldozers instead of walking plows, but the job was still tremendous.

Now this group of latter-day pioneers also has electricity, thanks to the cooperative efforts of Arizona Public Service Co. and California Electric Power Co.

The area is fairly inaccessible from Arizona Public Service Co. lines, so the company made arrangements to purchase power from Calectric, who in turn built a 33-kv line to the Colorado River. Arizona then tied in to the line to run it across the river and on out to the farmers and ranchers.

The 400-ft river-crossing span was built with the use of a farmer-owned and operated ferry, pictured above.

The line was first energized at 12,000 v, but with 14,000 more arable acres to develop, and anticipated irrigation pumping load forthcoming, it is expected that it will soon be operated at its full capacity.

Land that was once tenanted by jack rabbits and rattlesnakes is now producing cotton, produce, sheep, cattle—and probably a new crop of pioneers. Electricity will no doubt play an important part in their lives and in their own future pioneering efforts.

Public Power Group Opposes PNP Project

Opposition to the Mountain Sheep and Pleasant Valley projects of Pacific Northwest Power Co. has appeared in the form of a petition of intervention filed with the Federal Power Commission by the Northwest Public Power Assn.

The 15-page petition asks for federal development of the project with a single high dam at the downstream Nez Perce site.

Nez Perce has been proposed in the Corps of Engineers 308 Report as a potential hydroelectric site, but the corps has never pressed for funds because the project would block the mouth of the Salmon River, one of the great salmon-spawning tributaries of the Columbia.

• **A proposed merger** of Hilo Electric Co. and Kona Light & Power Co. in Hawaii fell through recently when Kona stockholders failed to vote a sufficient margin of approval. Merger terms had called for an exchange of the 25,000 shares of Kona stock for 8,000 shares of Hilo. Objections at a seven-hour meeting of stockholders were that the exchange rate was unfair to Kona stockholders. No new merger plans are being considered.

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Write for this informative "Rhino" line truck folder—or call the FWD utility specialist.

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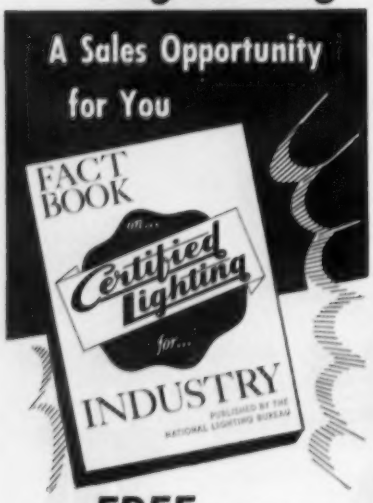

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Surveys show that 17 out of every 20 stores, offices and industries suffer from sub-standard lighting. To reap the harvest of this vast potential business, electrical contractors, lighting manufacturers and distributors, utilities and others in the lighting industry are now beginning an all-out campaign on Certified Lighting under the leadership of the Northern California Electrical Bureau.

Now is the time for you to plan your own sales promotion to tie-in with this outstanding advertising and publicity campaign to bring lighting installations up to standards recommended by the National Lighting Bureau.

Use the coupon below to obtain additional information on this industry-wide program. Don't delay —it's under way.

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Northern California Electrical Bureau
1355 Market Street, San Francisco 3

Please send me full information regarding the Certified Lighting program and how I may tie-in for bigger profit opportunities.

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Last Highgrove Unit Goes Into Production

California Electric Power Co. marked the end of a five-year, $20,000,000 expansion program in October when brief ceremonies launched the final unit of the company's Highgrove steam-electric generating station into service.

A. B. West, former Calectric president and now a director and financial consultant, opened the valve that let steam into Unit 4.

At the ceremony were Claude Smith, representing Fluor Corp., the construction firm that built Highgrove; Verne Miller, General Electric Co., who supplied the turbine generators; and various Calectric executives.

Highgrove station is now rated at 140,000 kw.

• **A proposed new charter** for the city of Tacoma that would place City Light under a superintendent appointed by the mayor has been approved by a freeholder commission elected earlier this year. To become effective, the new charter must be approved by voters in December or next spring.

• **Economies in construction** work leave Seattle City Light more than $200,000 for more arterial street lighting, and the city has already modernized more miles than anticipated.

Bids and Contracts

• **Electric Machinery Mfg.** Co. has received a Portland District, Corps of Engineers, contract to supply two 3,750-kva station service generators to The Dalles Dam. The contract amounts to $224,319.

• **Allis-Chalmers Mfg.** Co. will supply four 137,500-hp, 152-ft head hydraulic turbines to Washington Water Power Co. for Noxon Rapids on the Clark Fork in northwest Montana. The first is due for delivery the latter part of 1958.

• **Emil Anderson Construction** Co. will build British Columbia Electric Co.'s Daisy Lake Dam for $2,438,355. It is a component of the 142,000-kw Cheakamus River project.

• **Clark County PUD,** Wash., has budgeted $1,032,134 for line extensions, line rebuilding, transformers, automatic service restoring equipment, tools, laboratory equipment and street lighting for fiscal 1955.

• **Tri-Dam Constructors,** contractor for the Oakdale and South San Joaquin Irrigation Districts in California, has awarded a contract to **Allis-Chalmers Mfg.** Co. for a 74,500-hp hydraulic turbine for the Donnells project on the Middle Fork Stanislaus River.

• **Pacific Gas and Electric** Co. has awarded a contract for two turbines for its Poe power plant on the Feather River to **Pelton Water Wheel** Co.

• **British Columbia** Power Commission has called for bids to clear an estimated 80,000,000 ft of prime timber fringing Buttle Lake on Vancouver Island to precede construction of a dam on Upper Campbell Lake. Bids have also been called for clearing about 30,000,000 ft bordering Campbell Lake.

• **Food Machinery & Chemical** Corp., San Jose, Calif., has received a Corps of Engineers contract for manufacture of 70 gates and four stoplogs for The Dalles Dam on the Columbia River. Price is $205,827.

• **Westinghouse Electric** Corp. will supply eight generators and **General Electric** Co. the transformers and switching equipment for the Brownlee and Oxbow hydroelectric projects of Idaho Power Co. The orders amounted to a total of $13,620,000.

• **Pennsylvania Transformer** Co. will be awarded a $556,868 contract for manufacture of three 103,300-kva transformers for Chief Joseph Dam on the Columbia River, according to an announcement from the Seattle office of the Corps of Engineers.

• **Portland District, Corps of Engineers,** has invited bids for the last remaining large contract involving The Dalles Dam. Bids will be opened Dec. 1 for installation of about $3,500,000 worth of power-house equipment by Dec. 1, 1960. Bids were also called for about $200,000 worth of additional electrical equipment for opening Nov. 29. Delivery date is June 1, 1957.

• **Guy F. Atkinson** Co., South San Francisco, and **Ostrander Construction** Co., Portland, have been awarded a joint contract in the amount of $4,338,085 for construction of a closure dam connecting the east end of The Dalles Dam with the Oregon shore. Alterations of roadways and railroad tracks is also included.

• **Haakon L. Bottner Well Drilling,** Portland, has received the first contract for work on the Eagle Gorge Dam, a flood control project of the Corps of Engineers on the Green River 35 miles from Seattle.

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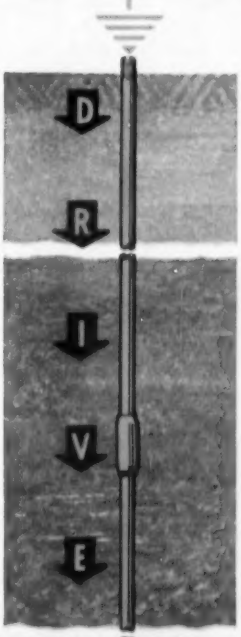

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NEWS ABOUT PEOPLE

Leihy Is New Editor Of Electrical West

C. W. "Brodie" Leihy will rejoin the staff of ELECTRICAL WEST on Jan. 1, 1956, when he takes over the editorship of the publication from George C. Tenney. The move is aimed to free the latter for additional responsibilities with the parent McGraw-Hill Publishing Co.

Leihy first joined ELECTRICAL WEST in the fall of 1930 after a brief engineering sales career with the General Electric Co. in the Pacific Northwest. He is a graduate electrical engineer of Oregon State College. He is a member of the AIEE.

Between 1937 and 1955 he was associated with the Haywood Publishing Co. of Chicago initially as editor and later publisher of *Electric Light & Power* and finally as executive vice-president of the publishing company. For five years during World War II he served in the armed forces retiring as a colonel. After graduating from the Command and General Staff School, he spent most of his military career in the operations division of the War Department's general staff.

• **David H. Redinger,** retired superintendent of Southern California Edison Co.'s Big Creek-SanJoaquin River hydroelectric development, was officially honored Oct. 24 by ceremonies naming the company's reservoir behind dam No. 7 "Redinger Lake." He was associated with the Big Creek development from 1912 until his retirement in 1947. He is the author of a history of the development, "The Story of Big Creek," published in 1949.

• **T. C. Woodside** has been named treasurer of Utah Power & Light Co., succeeding the late R. H. Jones of Salt Lake City, vice-president and treasurer. Woodside has been general auditor of the company for several years. New assistant treasurers are **George W. Fowler and Fred L. Michelsen.** All three men are presently located in the Salt Lake City company headquarters.

• **Arnold L. Henny** is director of the Columbia River 308 Review Section in the Portland district. He has worked on the 308 report on Alaska for the past five years.

• **M. G. Kennedy,** former sales promotion supervisor of Pacific Power &

Leihy

Light Co., is new manager of the sales, marketing and public relations department of Ebasco Services Inc. The department provides a consulting service for clients.

• **Robert Klatt** has resigned his position as manager of Big Bend Electric Cooperative, Ritzville, Wash.

• **Fairfax D. Kirn,** supervisor of concrete dam analysis at the Bureau of Reclamation engineering headquarters in Denver, retired Sept. 30 after 28 years of government service. He plans to operate a private consulting business in Denver.

• **Clarence J. Frenck,** engineer with the electrical section, design branch, Portland District, Corps of Engineers, has been granted a year's leave of absence to accept an appointment from the United Nations as a technical expert at New Delhi, India.

• **More than 850** prominent citizens and public officials of Los Angeles attended a dinner in honor of **Samuel B. Morris,** retiring general manager and chief engineer of Los Angeles Department of Water & Power. Former President Herbert Hoover, Vice-president Richard Nixon and many others were represented with messages of commendation for Morris.

• **John H. Goodwin** has been promoted to the position of vice-president and general sales manager of the pipe division of Johns-Manville Corp. He has been San Francisco district sales manager of the industrial products division since 1954.

• **Dr. H. W. Rochrig,** 120 Wall St., New York 5, N. Y., has been appointed representative and distributor for Auman Coil Winding Machines in the U. S. and Canada. The machines are made at Loehne, Germany.

Lenhart New Chairman Of Cheyenne Light, Fuel

H. Hugh Lenhart, vice-president and general manager of Cheyenne Light, Fuel & Power Co., is now chairman of the board of directors.

Succeeding Lenhart in the executive post is the former operating superintendent, Oliver P. Reed, with the company since 1931. Reed in turn was replaced by L. J. Weber from the electric distribution engineering department of Public Service Co. of Colorado.

• **W. Kimball Hayes** has assumed duties as West Coast credit supervisor for Sylvania Electric Products Inc., 215 Market St., San Francisco. The office is newly established to resolve quickly credit inquiries in the region.

• **Carlyle W. Miller** is succeeding **G. B. Mason** as area sales manager for Westinghouse Electric Corp. apparatus division, 410 Bush St., San Francisco. Mason has transferred to the Los Angeles office.

Johns

• **Stanley M. Johns** has joined Electric Corp. of California as vice-president and director. He was at one time southern California manager of Westinghouse Electric Corp. Another new director of Electric Corp. is **Page E. Golsan Jr.,** who is secretary of the firm.

Death

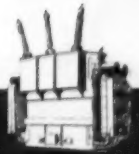
• **Max Lowenthal,** former associate of Thomas A. Edison, died Oct. 14 in San Francisco at the age of 81. When 13, he came to the U. S. from Germany, attended Columbia University, and joined the Edison group at Menlo Park in 1899, where he worked for three years. At one time he edited *Electrical World*. He moved to San Francisco in 1912 and was engaged in appliance merchandising the rest of his career.

TRAFFIC COP FOR 400,000 KVA

Contactors, the "traffic cops" in load-tap-changing equipment, are now available for typical regulating transformers rated as high as 400,000 kva. That's a whopping increase over the previous limit of about 150,000 kva.

It's all due to G.E.'s new oil-blast contactor—six years in development—thoroughly tested. Even under the maximum short circuit which might be imposed at the transformer terminals, this "traffic cop" will successfully divert current from the tap selector, permitting a tap change to be completed.

Already in use on the new 194,775-kva, 138-kv regulating and phase-changing transformer recently installed by Commonwealth Edison Company, these new contactors represent a major advance in power transformer design. General Electric Co., Schenectady 5, New York. 421-56



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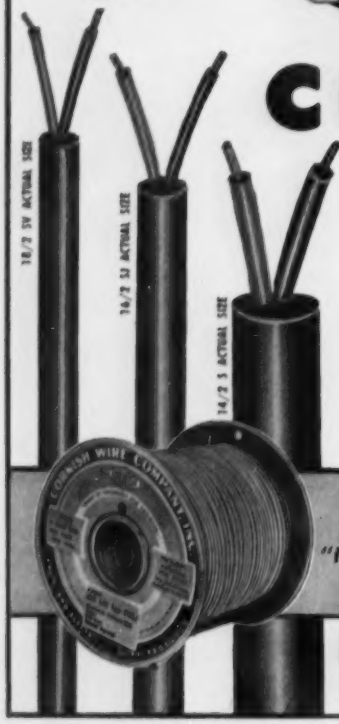

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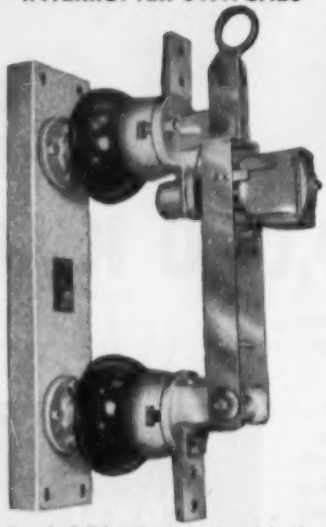

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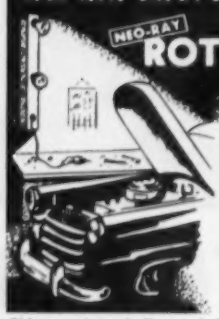

To get an abundance of light at hard - to - get - at places . . . repair shops rely on Roto-Strip. Its flexibility allows mounting anywhere — ceiling, walls, floors, etc.

This complete shallow unit (available in several types) has built-in recessed roto sockets that swing 90° in all directions through a complete 360° circle . . . and stay put at any angle. Available in stock sizes of 2'-3'-5' and 8' lengths.

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NOTES ON THE TRADE

Harvey Hubbell Execs Attend Coast Opening

Harvey Hubbell himself, president of Harvey Hubbell Inc., Bridgeport, Conn., manufacturer of wiring devices and specialties, came to San Francisco with Robert Weppler, vice-president and assistant general manager, and J. C. Hicks, vice-president in charge of sales, for the open house of the new offices and warehouse of Harvey Hubbell Inc., opened by Grover Anderson on Oct. 7. The new facilities at 1675 Hudson Ave. incorporates a 6,000-sq-ft building on a 10,000-sq-ft lot, providing ample parking space for customers. The facility will serve northern California and the Northwestern states and Hawaiian Islands.

The sales offices are arranged with folding partitions to open up into a sales meeting room. Display boards of the company's products are mounted on the walls. In the warehouse the stock has been stepped up 33% over previously carried Western stock. Ingenious use is made of Kindorf fittings to make substantial racks for the storage of shelf goods.

• **Let There Be Light!** is the name of a movie about street lighting that is available for showing from Line Material Co. local field engineers, or by writing the company at Milwaukee 1, Wis. Social, commercial, physical and psychological benefits of good street lighting are brought out as the story develops.

• **Roy Peck** Associates, Arcadia, Calif., and **Shaffer & Nelson,** Seattle, Wash., are now Western representatives of the Pole Line Materials Division of Oliver Iron & Steel Corp. The first firm covers southern California, Arizona and southeastern Nevada; the second serves Washington, Oregon, Idaho and western Montana.

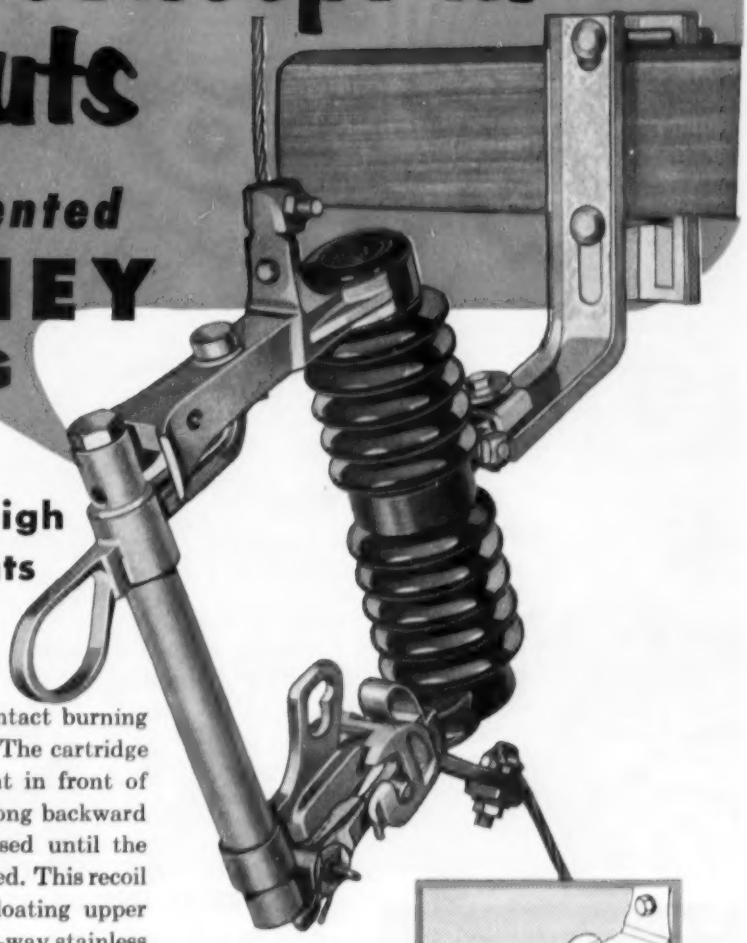
• **Colby Steel & Mfg.** Inc. has moved to newer and larger quarters at 65 Horton St., Seattle. Industrial cranes and hoists are products of the company.

• **Prescolite Mfg.** Corp. introduced several new lines of commercial and residential lighting fixtures at its first national sales conference held in Berkeley, Calif. The sales conference also climaxed a "Rags to Riches" sales contest conducted by the company in June, July and August.

Introducing . . .

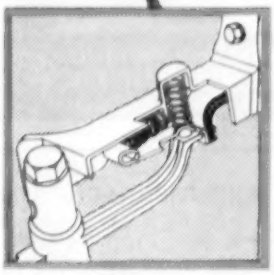
A new concept in cutouts

the *front-vented* KEARNEY TYPE G



Engineered to interrupt either high or low fault currents

With this new cutout design, KEARNEY has solved the problem of premature opening that causes contact burning on both high and low fault currents. The cartridge is double-vented with the upper vent in front of the tube. Gas expulsion creates a strong backward pressure . . . holding the contact closed until the current has been completely interrupted. This recoil is harmlessly absorbed by the full-floating upper contact which actually "floats" on two-way stainless steel springs.



In addition, the KEARNEY Type G Heavy Duty Cutout is designed with a new, high-strength, one-piece tubular insulator and new, rugged channel hanger. The upper contact is weather-protected and self-aligning. Standard button head fuse links are used.

-287

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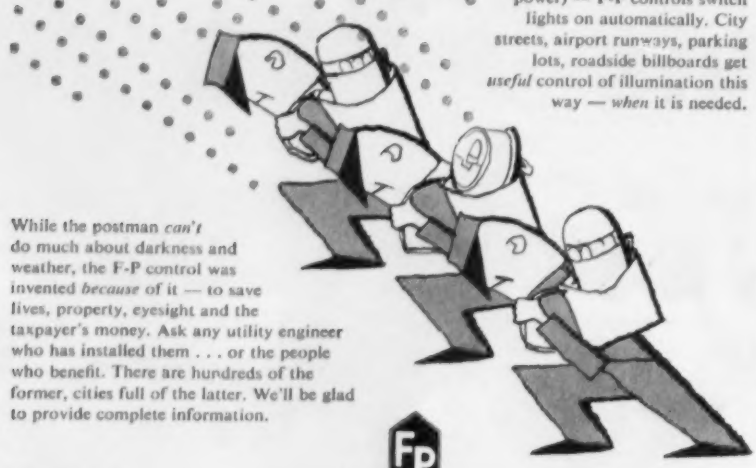
... can keep the dependable postman — or a Fisher-Pierce photoelectric lighting control — from "completing the rounds." Whether it gets dark at 3 o'clock in the afternoon or 8 at night . . . in any season and in any weather (as long as there's power) — F-P controls switch lights on automatically. City streets, airport runways, parking lots, roadside billboards get *useful* control of illumination this way — *when* it is needed.



While the postman *can't* do much about darkness and weather, the F-P control was invented *because* of it — to save lives, property, eyesight and the taxpayer's money. Ask any utility engineer who has installed them . . . or the people who benefit. There are hundreds of the former, cities full of the latter. We'll be glad to provide complete information.

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REPRESENTATIVES

If you do not find the name of your principal listed in Part II — Manufacturers' Directory — of this issue, please write us and we will see that listing appears in our next edition. *Electrical West*, 68 Post St., San Francisco 4, Calif.

• **Western Insulated Wire** Co., manufacturer of Bronco insulated electrical wires and cables, has completed a program of plant expansion that will raise output of finished product by about 80% at its Los Angeles plant. Features of the expanded production facilities include new wire drawing, bunching, stranding, rubber milling and vulcanizing equipment.

• **Fielden Instrument** Division of Robertshaw-Fulton Controls has opened a Western regional office at 3101 Imperial Highway, Lynwood, Calif. The office will provide engineering service and counsel on industrial instrumentation techniques. **Charles J. O'Lone** will supervise the new office.

• **Several production** departments of Sunbeam Lighting Co., Los Angeles, have moved into a new wing of the company's facilities.

• **Combustion Engineering** Inc. has promoted Frank J. Bader, San Francisco district manager, to the position of assistant general sales manager in New York. **Herman C. Reichard** is succeeding Bader in San Francisco.

• **Joe E. Pearce** & Associates, Albuquerque, N. M., now represents Automatic Switch Co. in Arizona, New Mexico and parts of west Texas. The company will sell ASCO electromagnetic controls.

• **Robert A. Young** & Co., Glendale, Calif., now represents Superior Switchboard & Devices Co. in southern California.

• **Square D** Co. has opened a new field office at 7495 Buena Vista Ave., Cucamonga, Calif. **John Poxon** directs local activities.

• **Holophane** Co. engineers from the West Coast attending a recent sales meeting in Newark, Ohio, are Paul Davis, Seattle, J. G. Platt, Los Angeles, and R. G. Dummel, San Francisco. They visited manufacturing facilities of the company while at the conference.

• **Babcock & Wilcox,** New York, displayed a model of the nuclear power generation plant it will build for Consolidated Edison Co. of New York at the "Atoms for Peace" Oct. 2-9 at Richmond, Calif. The Richmond show was part of the city's 50th anniversary celebration. Sponsors of the atomic power generation exhibit were Pacific Gas and Electric Co., Bechtel Corp., Standard Oil Co. of California, Henry J. Kaiser Co., Hercules Powder Co. and the Richmond banks.

In the 4th Century B.C., Damocles so admired royal luxury that Dionysius, the monarch of Syracuse, decided to demonstrate to him how precarious is the position of one in power. At a banquet he feasted Damocles in regal fashion. It was not until the dinner was well under way that Damocles noticed a naked sword suspended above his head by a single hair. *Damocles' Sword* has since come to represent an ever-present danger.

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There is a constant menace to cable directly buried in the ground, laid under water, or exposed to the air. The ravages of the elements hang as a threat like Damocles' Sword over cable unable to resist them . . . time itself makes inroads. Fortunately—but not accidentally—Kerite Cable is designed to "outlive," by many years, the destructive conditions of today and tomorrow. From the Arctic to the Tropics, Kerite Cables have served under the most adverse conditions. Unlike Damocles' Sword, Kerite, wherever it serves, engenders confidence.

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PROFILES

Kimball Carlton

George Kimball, retired, received certificate of honorary membership in International Assn. of Electrical Inspectors, of which he served as president, at Oct. 5 meeting. E. E. Carlton, successor, SW Section past chairman, made presentation in San Francisco

Kimball Jack, general sales and information manager, Washington Water Power, will take a trip to Europe as grand prize winner in G-E's recent contest for major appliance promotion by electric utilities. Jack and Gordon DeFoe, general sales supervisor, were named in the award the company received as nonmerchandising class winner

Mr. and Mrs. Robert B. Todd of Oakland, Calif., winners of the $30,000 Western Hotpoint Living Conditioned Home, are congratulated by Hotpoint President John C. Sharp in Chicago presentation ceremony

Jack DeFoe

Mr. and Mrs. Todd Sharp

"I was always washed out on washday...
...and then I got an automatic dryer!"
When the wash is out on the line, do you feel like a washout yourself? Who wouldn't, with all that lugging, stooping and pinning. Then, when the clothes finally dry, there's the same routine in reverse. Wouldn't you rather toss the wash into an automatic dryer? At the twist of a dial, the dryer gets them fluffy and sweet . . . or ready for ironing. With P. G. and E.'s low rates, you can run a dryer for pennies a week. See your appliance dealer and get rid of washday's hardest job!
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and then I got her an automatic dryer!"
Oh, the difference a dryer can make in a woman's washday mood! Gone is the back-breaking work—the lugging and stooping, the pinning-up and taking-in. All the lady does is cheerfully drop the clothes in the dryer—and in less than an hour, they're fluffy dry. Or ready for ironing, if she prefers. A dryer makes good budget sense, too. With P. G. and E.'s low rates, it runs for pennies a week. Does your wife still get the washday blues? See your appliance dealer about your automatic dryer, today!
Gas and Electricity are cheap in California!
P·G·and·E·
Pacific Gas and Electric Company

PROMOTION NEWS from P. G. and E.

This month, Northern and Central Californians will read these P. G. and E. promotional advertisements and when Californians buy and use more modern appliances, everyone profits... in business, in industry, in the home. For P. G. and E.'s low-cost gas and electricity can thus do more work, provide more of the comforts of life.

710-AX-1155

Gas and electricity are cheap in California

PCEA....

Out Of This World

A lot of trade associations seem to spend most of their time talking to themselves. Not PCEA! Our members are men of action who, when they see a need, do something about it in an organized way.

We've spent our 38 years of active life constantly working to improve the electric industry's service to our customers — and we've accomplished a great deal. Many of our activities have received national acclaim and serve as patterns being followed effectively throughout the entire country.

As firm believers that "Associations accomplish those things that most people think just happen," we invite you to take an active part in our work. Your industry — your company — and you — will benefit by joining us in PCEA. Contact either of our offices for further information.

PACIFIC COAST ELECTRICAL ASSOCIATION

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